F.M.S. JUL - 5 '28

F.M.S. JUL - 5 '28

F.M.S. JUL - 5 '28

UNIVERSITY OF ARIZONA
LIBRARY

GRAVURE, GUBELMAN, NEWARK, N.J. © PHOTOGRAPH BY PIRIE MAC DONALD

PRESIDENT 1927
OF
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

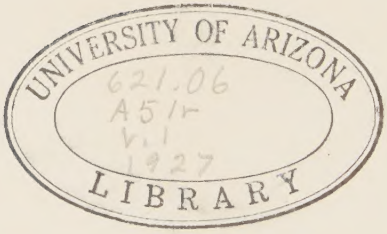
Record and Index

Volume 1—1927

Published by
The American Society of Mechanical Engineers
29 West 39th Street, New York, N. Y.

Copyright, 1928, by
The American Society of Mechanical Engineers

Printed in the United States of America by
The Lord Baltimore Press, Baltimore, Md.



FOREWORD

THE CONTENTS of this book are such as to require little in the way of introduction to its users, but perhaps its place in the new publications program of the Society, as well as its relation to former publications, should be made clear.

The purpose of the Record and Index is to record for reference the varied activities of the Society as a whole and those of its many units. Heretofore some of this material has appeared in the Year Book and some in Transactions. Under the new policy the Year Book is replaced by the Membership List, which contains only the alphabetical and geographical lists of members and the personnel of committees. The technical papers appear in Transactions which is now published in numerous sections throughout the year. Each section contains a group of papers sponsored by one of the Professional Divisions of the Society and bears the imprint of that Division.

The Record and Index, therefore, contains historical and reference material heretofore published in the Year Book and Transactions. It includes also an entirely new section: an index to papers and reports presented before the Society at its meetings during 1927 and published or scheduled for publication, and all codes and standards published by the Society during 1927. The title pages preceding this and other sections of the book give their exact scope.

In presenting this first volume of the Record and Index to the members of the Society, the Publications Committee solicits constructive criticism of the form and content, so that the imperfections brought to light by use of this book may be avoided in succeeding volumes.

K. H. CONDIT, *Chairman*
E. D. DREYFUS,
W. A. SHOUDY,
F. V. LARKIN,
W. H. WINTERROWD,
Publications Committee.

124564

Digitized by the Internet Archive
in 2022 with funding from
Kahle/Austin Foundation

https://archive.org/details/recordindex0001unse

TABLE OF CONTENTS

	Page
Presidential Address, by Charles M. Schwab: "Human Engineering"	6
Biographical Sketch, Charles M. Schwab	21
Report of Council	22
General Information	32
History and Scope, Constitution, By-Laws, and Rules, Administration, 33; Membership, 34; Insignia, Meetings, 36; Publications, 38; Professional Divisions, 40; Local Sections, 42; Student Branches, 44; Awards, 45; Research, 47; Standardization, 50; Power Test Codes, 52; Safety, 56; Boiler Code, 58; Joint Activities, 60; Library, 64; Code of Ethics, 65; Exchange of Courtesies, 66; Woman's Auxiliary, 67.	
Council, Committees, and Representatives	68
Reports of Meetings	82
Reports of Committees	120
Honorary Members	153
Past Officers	154
Membership of the Society, 1927	158
Index to Papers and Reports	160
Constitution, By-Laws, Rules, and Index	198
Necrology	241
Index	291

Presidential Address

CHARLES M. SCHWAB, President of The American Society of Mechanical Engineers for the year 1926-1927, delivered his presidential address Tuesday evening, December 6, 1927, as a part of the Presidents' Night program of the Annual Meeting of the Society. The address, on the subject of "Human Engineering," is presented here in full, and is followed by a biographical sketch of Mr. Schwab.

HUMAN ENGINEERING

By CHARLES M. SCHWAB, New York, N. Y.

OF ALL the arts and crafts and professions to which men devote their energy and their talents, none more profoundly affects the destiny of the human race than engineering. From the Pyramids of Egypt to the Panama Canal and present-day achievements in conquering time and space, the profession of the engineer has played a dominant part in the lives of men and nations. It has chosen the ablest, the most daring, and the most energetic of men, has inspired them with the desire for achievement, and has then exacted their utmost of devotion and service. It is but natural that the result has been measured in better and higher standards for society. Wherever engineering has excelled, there we find the highest order of life.

In their progress during the last half century, engineering and industry have marched side by side. Their development is a remarkable story of scientific achievement. The mobilization of capital and engineering talent has made possible the large-scale industry that is the leading characteristic of the wonderful era of progress in which we live.

Human Problems in an Industrial Civilization

This new industrial order created its own problems—new problems of social and economic aspect requiring the highest type of statesmanlike management for their solution. Industry has brought together and welded into single organizations hundreds, sometimes thousands, of human beings with widely different habits of life and thought. For the success and happiness of these human beings and of society as a whole, it is vitally important that mutual relationships should be adjusted on the basis of fair dealing and cooperation. Here is a problem embodying the recognition of all the differing physical and mental characteristics of individual human beings, and one peculiarly within the province of the engineer, which includes all industrial benefits to mankind.

Need for the solution of this problem brought forth a new concept of the management of business. At the same time it created a new science, a new field of engineering which, for want of a better name we call human engineering—the practical science of humanizing

industry and of making the men in it substantial, self-respecting workmen and citizens and factors cooperating in the success of the business. This new science recognizes that industry is dependent upon mass production, machine processes, and technical skill, but that the human element after all determines the progress of a business and its service to the country at large.

Conflicts in Industry Ruinous to All Parties

Forward-looking management, as well as far-sighted representatives of employees, are coming to realize that if full benefits are to be had from the creations of engineers, industry must be viewed as a cooperative undertaking, in the advancement of which every supervisor and every employee is an important factor. They recognize that conflict between capital and labor is destructive of the interests of each; that it is unnecessary and mutually expensive. Herein lies a field where expert service in enlisting the interest and confidence and good-will of the workers becomes just as important as the study that has been given to the characteristics and utilization of materials. Out of its solution comes a new code of economics, a code that aims not only to provide food and clothing and shelter, but also to elevate society at large and to place a true dignity upon labor, a dignity that yields a fuller and happier measure of life. It is highly fitting that we in America have led the way to better industrial relations, for indeed there is being brought forward a truer realization of the principles set forth in that great document signed at the inception of our nation enunciating the doctrine that among the unalienable rights of men are life, liberty, and the pursuit of happiness.

But this happiness does not lie along the road of abolishing work, for work is the cornerstone of real happiness. It lies in the doing of the day's work with a zest and good-will, under the spur of encouragement and rewarded with the satisfaction of achievement. This requires the cooperation of labor itself, not merely of the hand but of the heart as well. To obtain that cooperation requires leadership in industry that regards itself not as partisan but as a trustee striving to guide the efforts of both capital and labor into profitable channels.

Responsibility of Engineers in Human Relations

One cannot reflect on the subject of human engineering without realizing the tremendous responsibility that rests upon management in guiding the destiny of mankind. Indeed we are impressed that the solution of this problem holds out a challenge to industrial statesmanship that is of paramount importance to the prosperity of our nation. It is a tribute to American industrial management that these principles have largely been recognized, and that in this country today the

parties to industry generally recognize their responsibilities and opportunities.

In this human achievement, which is outstanding in the present era, the engineer has played a dominant part, for he has often played the rôle of manager too. It is highly proper that his efforts should be recognized. I can think of no more fitting illustration of the recognition of his contribution than the recent honor accorded a brother engineer, Mr. Eugene G. Grace, on the occasion of the award to him by one of our great universities of the degree of Doctor of Engineering. I cite this incident because of the peculiar personal satisfaction which it gave me, and because in presenting him for the degree the eminent educator paid a tribute to our whole engineering profession when he said:

> Mr. Grace was one of the first American business leaders to rise to the opportunity of bringing about better relations between employer and employee. By his vision and example in dealing with those hitherto unsolved economic and social problems he brought forth a new management in industry.
>
> Mr. Grace is not merely the executive head of the greatest independent steel corporation in the country, but has had from the beginning a profound acquaintance with the intricate technology of steel-making. As a student of economics he was able to appreciate that large production could be followed by high wages, and had the engineering skill to see that these benefits to his fellow men could be brought about by making the greatest use of electrical power in manufacturing processes.
>
> It is not, however, the stupendous growth in the physical plant nor the mere mastering of machine production on which rests Mr. Grace's reputation as a captain of industry. Though less spectacular, his pioneer work in Human Engineering—the practical science of humanizing industry—is perhaps his most outstanding achievement.

Efforts of Engineers and Managers to Solve Capital-Labor Problem

From the problem growing out of employer-employee relationships in modern large-scale industry, let us turn now to the efforts at solution that have been made by engineers and managers in responsible control of business enterprises. In dealing concretely with this part of the subject, I hope I may be pardoned for drawing illustrations largely from the experiences of the Bethlehem Steel Corporation, which is only one of many industrial concerns that in recent years have taken advanced positions in this vitally important subject.

Our job primarily is to make steel, but it is being made under a system which must be justified. If in addition to manufacturing products this system does not enable men to live on an increasingly higher plane, if it does not allow them to fulfil their desires and satisfy their reasonable wants, then it is natural that the system itself should fail.

Reasonable Wants of Industrial Workers

What are these reasonable wants of employees, which they have a right to see satisfied as far as conditions of industry permit? I believe they include the payment of fair wages for efficient services; steady, uninterrupted employment; safeguarding of their lives and health, good physical working conditions; a voice in the regulation of conditions under which they work; provision for them to lay up savings and to become partners in the business through stock ownership; and finally, some guarantee of financial independence in old age.

Modern Management and the Fundamental Question of Wages

The desire of labor in connection with wages can, I believe, best be fulfilled by rewarding men in accordance with their contributions toward the success of the business. It is fundamental with human beings that they want individual recognition of and reward for their talents and achievements. This is the crux of the wage problem. The nearer we can come to fulfilling this want on a sound, justifiable basis that recognizes individual merit, the sooner shall we witness the solving of a long-standing and contentious question.

Relations in industry have sometimes become strained over the fundamental question of wages. The area of conflict was widened because of adherence to a policy which sought to group together at a uniform wage, regardless of individual performance, large bodies of workers even though geographically widely separated. Such a policy often tended to discourage effort and to reduce individual output to a standard set by the least efficient worker.

We have traveled far in our thinking on this fundamental question of reward for service. We have come to have a new view-point toward the payment of wages. Our better relationships have brought a clearer understanding of the reciprocal value to national well-being of a class of well-paid workers whose buying power is sufficient to take the output of our mass production. We are ambitious to see our workers receive an adequate wage—a wage that is sufficient to afford a worker and his family a decent standard of living with a margin for laying something aside—but we cannot entertain any uneconomic theories as to doles or subsidies. We cannot lose sight of the fundamental law that requires full value in services for wages paid.

How to measure and relate output and wages on some fair basis has become an important function of management. We now realize the essential benefits derived from relating compensation to the contribution made by the individual, with the result that under the stimulus of measured return for service rendered there is an increasing tendency for men to take a keener interest in the business, much as if they owned it. This applies to workers as well as managers.

Economic Status of American Wage Earners

The economic position of our workers has become the wonder of the world. The earnings of American wage earners in terms of what they can buy are probably greater now than at any previous period in American history; certainly they are far greater than those of the workingmen in any other country of the world. In the face of these higher earnings our foreign brothers marvel at the coincidence of lower costs. The answer is that American workmen have come to realize that wages and profits are paid out of the same pocketbook and that the return to each must be proportionate to effort expended. American workmen are responding to the bid that is being made for their cooperation and realize the important factor they are in the success of the business, and they appreciate that their employers under an enlightened human-relations policy are striving to provide as high wages as can be paid consistent with sound management and the safeguarding of the investment and in line with general economic conditions.

Steady Employment

High wages do no good to the man who has no chance to earn them. Hourly and daily rates mean little to the employee who can work only a few days a month or a few months out of the year. Steady employment, therefore, ranks high among the needs of the workman. During the last few years industrial managers have been giving much thought to this question—to the elimination of the evil of unemployment. It has come to be realized that peaks and valleys of industrial activity, during which periods of feverish effort to get out products alternate with periods of idleness and stagnation, not only are undesirable from the standpoint of the workingman but are wasteful and expensive to industry and to society as a whole. Toward the leveling of these peaks and valleys much has been done by the intelligent efforts of management; perhaps even more has been accomplished as a result of the sustained purchasing power built upon high wages and of the changed buying methods of the public. This last-named element, in turn, has resulted largely from the increased capacity and reliability of both production and transportation. Thus we see the interdependence of all the elements in that intricate machine we call industry.

The records of our own company illustrate the substantial progress which has been made in reducing these peaks and valleys. Whereas the high and low points of employment a few years ago fluctuated 50 per cent from the average, during the following years these fluctuations were steadily reduced until in 1926 the high and low points of employment as measured by the payroll varied hardly 8 per cent from the average for the year. This regularity of work is not only

of vital importance to employees but it has a far-reaching influence on good business.

Financial Interest in the Business

But even with good wages and steady employment, the workingman is likely to lack one factor essential to his fullest efficiency and greatest interest in the company by which he is employed. This factor is ownership. A sense of proprietorship affords a powerful incentive to arouse interest in the performance of work. This principle has been the motivating influence of those who have been willing to take the risk incident to the building of all business. Its application to the wage earner in industry is relatively new, yet nowhere is the whole-hearted interest of human beings so necessary and vital to successful accomplishment. Recent years have seen a considerable growth in stock ownership by industrial employees. I would not minimize the possibilities of danger involved in this practice, nor would I urge every company, regardless of the character of its securities, to enlist its wage earners as partners. Under favorable circumstances, however, and with the proper safeguards against speculation and possible loss, stock ownership by employees may be one of the most successful incentives to thrift and to vital interest in the enterprise. We are greatly encouraged with the results of our own experience along this line. In our efforts to increase the interest of our employees in the business and at the same time to afford them a means of saving and investment, Bethlehem has for several years encouraged the employees to acquire ownership through the Employees' Saving and Stock Ownership Plan.

That they have enthusiastically responded to this opportunity is shown by the fact that in the short period of four years over 50 per cent of our employees have either paid or are paying for substantially 17 per cent of the corporations' stock of this class outstanding, representing an investment at par value of $17,000,000.

It is gratifying and highly significant as reflecting the present economic position of the workers that their wages have permitted them to make such substantial savings, but it is equally significant that they now have become capitalists with a financial interest in the business.

Under a plan of this kind the mutuality of interest which should exist in industry finds its greatest expression. On the one hand the company prospers because the employees strive for the elimination of waste and the better doing of their jobs, and on the other hand the employees themselves profit as the company prospers.

Cooperation through Representation Plan

Successful human relations in industry recognize that the interests of employees and employers are mutual. It is recognized that as

enemies they cannot long endure; they must be friends. The very nature of their aim for profit creates an interest in one another's well-being.

It is true that just as in any human relationships there are day-by-day problems arising in industrial relations which, if not settled with full justice to each, will threaten this bond of friendship. But the need for a medium for preventing or adjusting breaches in relations is not the whole objective of employees and employers. Essentially these two parties have been seeking a medium that would provide a common meeting ground. They have really been seeking for a way of living together which would permit an expression of their personality and yet cement and increase this friendship. The employee-representation movement is such a constructive medium, permitting not only settlement of questions on which there is a conflict of interest, but, of even more importance, offering an unobstructed channel through which their unity of interest may be promoted.

The cornerstone of Bethlehem's relations with its employees, in so far as their direct contact with the company in their daily job is concerned, is the employees' representation plan which was inaugurated nine years ago. To this plan and to good faith in living up to its provisions is to be attributed much of the gain in cooperation and good-will which we enjoy in our internal relationships.

Our company was one of the first to inaugurate employee representation in its plants, and in the early stages of the plan there was a natural tendency to lay the greatest emphasis upon its possibilities as a mechanism for grievance adjustment. Experience has shown, however, that this phase of its operation is giving way more and more to constructive efforts to improve conditions in the business and to constructive cooperation along the lines of increased efficiency, elimination of waste, and improved methods and quality and quantity of products. Along with this development has come a growth in morale and in sympathy and understanding between the employees and the officials. On the one hand the employees have gained a more intimate knowledge of their company and its objectives, and on the other hand the supervisors have come to realize more definitely than before their function as leaders rather than as drivers of men.

How the Representation Plan Works

The plan, in its essentials, provides for the election by ballot of representatives by and from among the employees. It has for its purpose four fundamentals: to give the employees a voice in the determination of the conditions under which they work, to promote cooperation between employees and management in matters of efficiency and economy, to furnish machinery for the prevention and

adjustment of differences, and, so far as possible, to provide and foster continuous employment.

The plan is primarily a system which provides for election by shops or departments of representatives to meet and deal with the management for the discussion, regulation, and adjustment of matters having to do with all the conditions which may arise out of employment. Nominations and elections are held annually in each plant by secret ballot, and are conducted by the employees themselves with only such assistance from the management as may be required.

The annual elections give an indication of the interest of the employees in this plan. The average percentage of eligible employees voting last year at the different plants was 93 per cent. Between 1918 and 1926 this percentage rose from 60 per cent to the present figure.

All action taken under the plan is joint action, and regular meetings are held with management representatives to discuss and pass upon questions that may arise.

Each employee representative is guaranteed full independence of action, and Bethlehem accepts the policy of arbitration. In other words, if no satisfactory adjustment of the case is reached, it may be left to arbitration. In no case, however, during the past nine years has it been necessary for any case to go to arbitration.

Annual Conferences with Employees

One of the striking developments of this whole system, and one which represents in our judgment a far-reaching step, is a series of annual conferences at the various plants of the corporation. One of the objects of these conferences has been to make an annual report to employees just as the corporation makes an annual report to its stockholders. At these meetings the employee representatives and management representatives sit down with Mr. Grace, the president of the company, and other executive officers for the consideration and discussion not only of employee matters, but of general business conditions and questions of company policy.

At this year's conferences, which were concluded a few months ago, I had the opportunity to join in these proceedings, and nothing could indicate to me more clearly than these meetings the fact that over the last few years real progress had been made in better industrial relations and that such cooperative activities as I have mentioned lead to constructive endeavor on the part of both management and employees and to material benefits to all concerned. At these conferences all subjects relating to employees and their welfare are discussed, the company executives report on the state of business and the outlook for the year as it may affect wages, working conditions, and the

volume of product, and the employees present their point of view on their activities, on the steel business, and on plant operations. The officer in charge of industrial relations makes a report on the operation of all employee activities, and the president himself discusses in a most intimate manner all phases of the corporation's business. Suggestions are freely made and openly debated. The result is that both management and men get an insight into what each other is thinking and an understanding of the other fellow's point of view, which cannot but be effective toward advancing the interests of all.

Safeguarding Life and Health

With high wages, steady employment, a financial interest in the business, and a means of contact and cooperation with the management through representatives of his own choosing, the wage earner has perhaps secured the fulfilment of the most important and vital of his desires. There are other factors in industrial relations, however, which should by no means be overlooked. One of these concerns the safety of work and the provision made for the employee in the event of sickness or accident. For indeed both sickness and accident affect both wages and stability of employment.

Advances made in industrial-safety work since the beginning of the century have been noteworthy and reflect credit alike upon management and men, for essentially it has been a cooperative movement. Much of this advancement has been due directly to the efforts of the larger industrial corporations. One of the things for which the world will long remember my friend, the late Judge Gary, was his continued and successful effort to improve safety conditions in the great industrial organization of which he was for so many years the head.

Bethlehem carries on a thoroughly organized and persistent campaign of accident prevention, first-aid instruction, and safety work. Permanent safety committees consisting of employees of various operating departments are charged with the duty of cooperating with their immediate supervisors in maintaining maximum safety of working conditions, and they receive additional compensation for this service. One of the features of the first-aid work carried on under the guidance of competent doctors and nurses is a meet at which first-aid teams from various plants compete for substantial cash prizes. Since the beginning of this work more than 8000 of our employees have received first-aid instruction.

To assist the employee in case of sickness or death, the corporation has a relief plan which covers all employees. Its purpose is twofold: first, to provide disability benefits when their income is cut off because of sickness or accident not provided for by law, and second, to provide death benefits for the widows and dependents of employees. Funds

for the payment of benefits are derived from contributions by the employees and from contributions by the corporation, the corporation assuming all administrative expenses.

The administration of this plan is typical of Bethlehem's policy of joint management of affairs directly affecting the employees. Questions of general policy, amendments, changes, and problems arising under the plan are determined by a board of trustees, half of whom are chosen by the employees and half by the management. The amount paid out yearly in benefits under this plan is nearly $1,000,000, and substantially all eligible employees throughout the corporation have become participants in it.

The company also maintains a well-organized medical service in each of its plants for the convenience of the employees, in the belief that sympathetic understanding on the part of the plant doctor is of equal importance to technical skill and that the medical department contributes a great deal toward providing steady work. As a result of all this effort we have reduced preventable accidents nearly 60 per cent in the last 11 years. Here is another example of a worthy contribution through cooperation toward a better day in industry with the result that there is a return to the employee in a physical and monetary saving, a return to the employer in lower costs, and a return to the community through a lessening of care for the maimed and disabled.

Provision for Support in Old Age

One of the most difficult problems not only in industry but in society as a whole is the maintenance of those who on account of old age are no longer able to support themselves. Many industrial companies have recognized an obligation in this matter and are seeking to provide for their aged employees through various types of pensions. To meet the economic needs of the aged worker, however, is not the only aim of a pension plan; it also provides a highly fitting basis for rewarding those faithful workers who have given their best years in the service of the company.

Bethlehem has a pension plan under which an employee who has reached the age of 65 and has rendered 25 years of service may retire on a pension. There are today under this plan more than 1000 former Bethlehem employees who, while not rendering active service to the company, are nevertheless as whole-heartedly interested as ever in its success. Ours is one of the newer pension plans, having been established only about five years ago, but already there is being paid out to pensioners nearly one-half million dollars a year.

Aid toward Home Ownership

The present tendency of workers to invest in the purchase of what are regarded by some as luxuries is sometimes viewed with concern.

On the whole I believe this tendency is but a step in the march of progress to a higher standard of life—a fulfilment of the new code of economics under which the luxuries of yesterday are becoming the necessities of today. Fundamentally the whole trend is based upon the better economic position of the worker helping to place these conveniences within the reach of all. Workers will acquire them in accordance with their economic ability and to suit their individual tastes. They will make their own decisions as to their individual needs, and will not require any special assistance in doing so.

But in the desire for home ownership, which ranks high among the ambitions of the average workman, there is generally need for financial assistance. We believe that any assistance we can render our employees to help them realize this desirable ambition not only makes for better standards for them, but makes for a better community as well.

With this in mind Bethlehem for several years has had a plan under which the company helps its employees purchase homes on easy partial payments. The company has thus assisted employees to build or buy homes valued at several millions of dollars. Its aid in this housing program takes the form mainly of guaranteeing or purchasing the second mortgage on the property. The employee has the advantage of advice from the company's architectural, engineering, financial, and legal departments. He receives full title to the property, is under no obligation to the company so long as monthly payments on the mortgage are kept up, and his dependents are protected in the event of his death by a life-insurance policy at low rates during the term of his indebtedness.

Measuring Benefits of Human Engineering

If I have seemed to give undue prominence to the human-engineering program of the Bethlehem Steel Corporation, it has been done merely in order to illustrate the general tendency of large-scale industry by concrete facts drawn from the organization with which naturally I am most familiar. Industry as a whole, and particularly that part of it to which the term "big business" has been applied, has made important progress along this line of bringing justice and cooperation between employers and employees.

Naturally, such an ambitious program has not been put through without expense, but we do not believe that this money is being used unwisely. We look upon it as being really an investment in national well-being.

I realize in what I have just said I am making a broad claim. Engineers are practical men and some of you may be inclined to ask upon what I base my statement. The question is a fair one, and it brings

us squarely up to an inquiry as to the results of modern methods of labor management—the results of this human engineering to which we have been giving consideration.

Should we be content to accept the often expressed opinion that the benefits are intangible and simply rely upon our faith to justify our efforts? Will the average citizen merely applaud this new order as a desirable and worthy ambition for better conditions on the part of the definitely affiliated factors in industry, or will he, whatever may be his calling, see beyond and realize that he is personally and profoundly affected?

Surely the engineer with his trained powers of analysis will be among the first to see the effect that these better relationships have had in advancing his own science, for he no longer finds an unenlightened resistance to the fruits of his genius. Indeed he has come to be regarded as an indepensable ally of employees as well as employers under this new order. And the benefits to employees in an improved economic status and to employers in increased good-will and productivity and steady operations are so readily recognized as to assure no backward step by either party.

Effects upon the Stability of Business

But I must go beyond merely the benefits to employers and employees, important as these benefits are, if I am to justify my statement that the money spent upon human engineering is an investment in national well-being. Let us turn then briefly to some of the advantages that have accrued to the nation and to society at large. To start with one of the most obvious, I believe that the present stability of business is due largely to the better relations that have been brought about between employers and employees. It was not so many years ago that buyers of basic products were under a constant fear that their supplies of essential materials would be interrupted by strikes, lockouts, or other overt expressions of industrial ill-will. They could not be sure of uninterrupted production. Therefore it was quite natural that they bought beyond their needs and laid up surplus supplies which, in periods of business recession, were dumped on the markets and added to the demoralization and stagnation which formerly characterized several downturns in the business cycle.

Today this situation has changed. It is only in a few industries, having special problems of their own, that there is at any time any serious danger of suspension. Buyers realize that they are no longer the victims of conflict and misunderstanding between management and labor in the producing industries. The confidence which they have therefore come to have in the ability of industry to supply continuously and uninterruptedly their requirements has revolutionized purchasing

methods. Within the last few years we have seen the purchasing public abandon its long-established practice of rushing in to place orders upon a basis that required full-capacity operation for a time and then withholding its patronage during a period of lessened production, unemployment, and economic distress.

This new method of buying has gone far to level the peaks and valleys which formerly characterized the business cycle. It would be too optimistic to hazard the prophecy that these peaks and valleys have been entirely eliminated. Even the most conservative of us, however, has evidence that their extent and severity have been greatly reduced. For this important advantage to business and to the public I give much credit to the better relationships that have been built up between management and employees.

Sustained Employment and Purchasing Power

With this greater stability of business has come more regularity of employment. A few minutes ago I spoke of steady employment as one of the reasonable desires of the laboring man. Now, however, we should consider it from the standpoint of business as a whole and of the nation. Until recent years a large amount of unemployment was considered to be natural and inevitable, under certain circumstances. It might be caused by the stagnation resulting from the downturn of the business curve, or it might be voluntary idleness due to strikes and misunderstanding within industry.

Gradually it was realized that under the interdependent linking of one industry with another, enforced unemployment in one line of business might be the result of voluntary idleness in a related enterprise.

However diverse may have been the causes of unemployment, there was no doubt as to its harmful results not only upon the workman and his family but upon business and society. Injury to business and society became constantly greater in the measure that industry came to depend upon the purchasing power of the wage earner for a large portion of its market. It is surely apparent to us today that no section of our population can remain idle over a protracted period—whether involuntarily as a result of business decline or other circumstance, or voluntarily as a result of industrial misunderstanding—without this situation affecting the whole economic structure of our nation, for continuous employment and adequate buying power of the workers and a fair and steady return to investors are the foundation of our national well-being.

Human engineering, therefore, by improving the relationships between employers and employees, has lessened industrial conflict and misunderstanding, benefited workers and owners of industry, stabilized

business through improving service to the purchasing public, and fostered the continuous employment at high wages upon which is built our present economic prosperity.

Opportunities for Further Service

Successful industrial management in the future is going to depend more and more upon management of men rather than upon the organization of machines and other problems which are ordinarily considered in the sphere of practical engineering. For the most part and generally speaking, the engineering profession may be said to have solved or laid the groundwork of solution for the essential problems of the engineer in his technical field. Experience shows, however, that industry's most important task in this day of large-scale production is management of men on a human basis. Not only is this essential as affecting production, but it is becoming increasingly more important toward the maintenance and development of industry's own markets, for under present-day economic conditions in America, workers are more than producers, they constitute the very backbone of large-scale consumption.

Let us hope that the new view-points from which industry is being regarded will hasten the day when we shall cease to talk about a separation between labor and capital and begin to think of management in an all-inclusive sense—a new concept of management to include employees and employers striving hand in hand to bring success to the undertakings in which they are engaged.

The opportunities for further service in industrial statesmanship and engineering are indeed immeasurable. We have not attained perfection but we have made real progress and reaped substantial rewards. This knowledge should hearten us to strengthen, perpetuate, and extend the principles of this new order of human relations, so gloriously started, that we may have a nation of contented, self-respecting workers and citizens, and a sound, prosperous, progressive industry in the interests of society at large.

In my belief that we shall continue to meet this challenge lies my abiding faith in the future of American industry.

Charles M. Schwab

Charles M. Schwab, President of the Society for the year 1926-1927, was born at Williamsburg, Pennsylvania, on February 18, 1862, and spent his childhood from his fifth year at Loretto, Pennsylvania. He received his education at village schools and at St. Francis College. He has received honorary degrees from Lehigh, Stevens Institute of Technology, Lincoln Memorial University, St. Francis College, New York University, and the University of Pennsylvania.

Mr. Schwab entered the steel business as a stake driver in the engineering corps of the Edgar Thomson Steel Works where he served as chief engineer and assistant manager from 1881 to 1887. For the next two years he was superintendent of the Homestead Steel Works, and from 1889 to 1897, general superintendent of the Edgar Thomson Works, and of the Homestead Works from 1892 to 1897. From 1897 to 1901 he was president of the Carnegie Steel Company, Ltd., and from 1901 to 1903, president of the United States Steel Corporation. He is now chairman of the board of directors of the Bethlehem Steel Corporation and the Chicago Pneumatic Tool Company; he is also a director in many other industrial and commercial enterprises.

During the War, Mr. Schwab acted as Director General, Shipbuilding, U. S. Shipping Board, Emergency Fleet Corporation, April to December, 1918. In December of the same year he was elected an Honorary Member of the A.S.M.E.

Mr. Schwab has given largely to philanthropic causes.

On the occasion of his election to Honorary Membership in The American Society of Mechanical Engineers, December 3, 1918, Mr. Schwab said, "It is not the great public reputation that brings satisfaction to the human heart of men worth while, but it is the acclaim and approval of the people who have known him and have known what he has done, and there is no honor that I have ever received, and there is no acclaim to which my ears have ever listened, that will bring me a deeper sense of real satisfaction and pleasure than the approval of this great engineering society of the United States."

Mr. Schwab has earned a reputation for the skill with which he handles men and the close contacts which he maintains with those working for him, characteristics which have endeared him not only to his own associates but also to the public at large.

Report of Council

THE Report of Council for the fiscal year 1926-1927 was presented at the Business Meeting of the Society, Wednesday afternoon, December 7, 1927, by Calvin W. Rice, Secretary of the Society. The details of the year's activities were recorded in the reports of the Standing Committees of Council and of the Boiler Code Committee which formed a part of the complete Council report and are given on pages 120-152 of this volume.

REPORT OF COUNCIL

THE Society year covering the term as President of Charles M. Schwab has been an especially active year in the history of the Society, and one in which the Council records anew its especial obligation to committees who have completed many difficult tasks, both in the preparation of technical reports and in outlining future policies for a broader and more helpful Society, reaching out, as is our aim, to cover the ever-widening and diversified interests and duties of the engineer — our members — and as engineer-citizens. All the technical activities have been maintained with great interest and energy and with the motive of service.

The reports of the Standing Committees of Council and of the Boiler Code Committee give more detailed records and are submitted as a part of the complete report of Council.

Finances and Special Funds. The report of the Finance Committee and the auditor's report reveal the splendid financial condition of the Society. It is difficult to visualize a professional success unless accompanied by a financial success. We have a total of custodian funds of approximately $32,049, on the unused balance of which interest is credited at regular intervals to augment them for the conduct and support of research work. Trust Funds held for special purposes, notably awards and assistance to students, amount to approximately $131,236. These, to which attention is called, are:

Junior and Student Awards (Fund given by the late Henry Hess); Melville Medal Fund (Bequest of Rear-Admiral Melville, Past-President and Honorary Member); Charles T. Main Fund (Past-President); Holley Medal Fund (Given by Geo. I. Rockwood, Past Vice-President); Major Max Toltz Fund (Past Member of Council); and John R. Freeman Fund (Past-President).

Engineering Education and Training. The Committee on Education and Training for the Industries aims to assist men below the college grade, and as directly affecting and assisting in the needs of the industries an Advisory Committee is to be appointed to assist and advise with the Society's committee.

The Engineering Education Survey in which the Society is cooperating through the Society for the Promotion of Engineering Education is progressing and has brought out much helpful information for the training of the future engineer. It has been of great help to our Committee, which is also carrying on a very efficient relation with the colleges through the ninety-two Student Branches.

Technical Committees. The Standardization, Research, Power Test Codes, Safety, and Boiler Code committees, with their numerous subcommittees, cover a great variety of highly specialized and important work. These committees comprise approximately a membership of 1036 and cover a diversity of problems and talents.

At the personal request of the President, the Standing Committee on Research has made a thorough study of the present status of industrial research in the United States and Europe, for the purpose of developing a program for research in mechanical engineering which would be in line with past experiences and would be broad enough to enlist the interest and financial support of the leaders in the engineering and industrial world.

Notable also this year was our representation at the International Electrotechnical Congress in Italy. Dr. W. F. Durand, Past-President, was the special representative from the Society, and presided at five sessions of the I. E. C. Advisory Committee No. 4 on Prime Movers, having under consideration the proposed international agreement on the testing of hydraulic turbines. He was most ably assisted by other members of the U. S. Committee in the preliminary work for these sessions, Dr. F. R. Low, Past-President, and C. Harold Berry; while R. D. Johnson and Francis Hodgkinson with Dr. Durand reported the sessions on Hydraulic Turbines and Steam Turbines, at the I. E. C.

Meetings. The two general Society meetings were held this year, the Annual Meeting in New York, December 6-10, and the Spring Meeting at White Sulphur Springs, W. Va., May 23-26, 1927. This was a variation from the usual spring meetings in industrial centers, and furnished an excellent opportunity for the members to become better acquainted.

The Professional Divisions and Local Sections, cooperating with the Committee on Meetings, have accomplished a notable year's work, as is brought out in detail in the reports of the Local Sections Committee and the Professional Divisions Committee. It is important to note that at some of these meetings the registration was over 800, placing these meetings in the same rank for importance and interest as the general meetings of the Society.

Plans are already in hand for the Spring Meeting and the semicentennial of the A.S.M.E. in 1930, commemorating the first meeting fifty years ago. April 7, 1880, held at Stevens Institute of Technology. Volume I of the Transactions gives some interesting records of that meeting and the names of the "pioneers."

Publications. Wide publicity has been given the comprehensive revision of the Society's publications policy which provides for a much-needed expansion through the publication of an increased amount of specialists' material in quarterly form as sections of Transactions, as

well as retaining *Mechanical Engineering, A.S.M.E. News,* and Membership List, and including a new volume, the Record and Index.

Membership. A summary of membership changes for the fiscal year 1926-1927 is presented below. The figures show a healthy and normal growth, with a larger number of students who are the prospective active members of the Society. At the date of this report, November 20, 1927, the membership totals 18,188.

Membership Changes—October 1, 1926, to September 30, 1927

	Membership			Losses			Additions		Totals		
	Oct. 1, 1926	Oct. 1, 1927	Trans. from	Resigned	Dropped	Died	Trans. to	Elected	Loss	Gain	Change
Honorary Members	21	21									
Life Members	81	77				4			4		4—
Members	8255	8349		103	274	96	110	457	473	567	94+
Associates	729	642	3	72	51	7	2	44	133	46	87—
Associate-Members	4185	4232	129	92	207	11	99	387	439	486	47+
Juniors (20)	752	871	52	46	35	6	258		139	258	119+
Juniors (10)	3604	3890	285	101	162	5		839	553	839	286+
	17627	18082	469	414	729	129	469	1727	1741	2196	455

Awards. The official awards of the Society for 1927 are:

Student Awards to Alfred H. Marshall of Princeton University for his paper, Evaporative Cooling, and to Roger Irwin Eby, University of Washington, for his paper, Measurement of the Angular Displacement of Flywheels.

Junior Award to William M. Frame, Sharon, Pa., for his paper, Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressure.

A.S.M.E. Medal to Wilfred Lewis for his contribution to the design and construction of gear teeth.

Melville Award to L. P. Alford for his paper, Laws of Manufacturing Management.

No award was made for 1927 from the Charles T. Main Fund, nor of the Holley Medal.

General Intersociety and Public Relations

Intersociety Relations are considered by the Joint Conference Committee, composed of the presidents and secretaries of the four Founder Societies, wherein matters of common concern are discussed to develop uniformity of action by recommending a course of procedure to the several boards of direction. Through the United Engineering Society, the John Fritz Medal Board of Award, the American Engineering Standards Committee, the Educational Survey with the S.P.E.E., and the American Engineering Council, special society mat-

ters are given attention. Briefly the Secretary reports for record the following activities:

John Fritz Medal Board of Award is composed of four members each, named by the four Founder Societies.

The medal for 1926 was awarded to Elmer Ambrose Sperry, member A.S.M.E., for the development of the gyroscope compass and the application of the gyroscope to the stabilization of ships and aeroplanes. The medal presentation was one of the ceremonies of "Presidents' Night" of the Society, December 7, 1926. The medal for 1927 was awarded at the annual meeting of the Board of Award, on October 21, 1927, to General John J. Carty for pioneer achievement in telephone engineering and in the development of scientific research in the telephone art, and will be presented in connection with the Annual Meeting of the American Institute of Electrical Engineers in February, 1928.

The Chairman of the Board of Award for the current year is J. V. W. Reynders, Past-President, American Institute of Mining and Metallurgical Engineers. The new members from the several societies are: John F. Stevens, A.S.C.E.; E. DeGolyer, A.I.M.E.; Charles M. Schwab, A.S.M.E.; and Bancroft Gherardi, A.I.E.E.

United Engineering Society administers the property of the Founder Societies.

The cost value of the real estate administered by U.E.S. is $1,973,410.42, and the total of all funds at present par value of investments is $986,350, yielding a total annual income of $48,000, or the equivalent of an average rate of 4.9 per cent per annum.

Library of United Engineering Society comprises 125,000 volumes and is valued, for purposes of insurance, at $342,500. A report is published in January of each year. The Library Committee has given a brief résumé of the work this year in the Annual Report of the Standing Committee of Council which comprises A.S.M.E. representation on the Library Board. The gift by Dr. Douglas in 1926 of $106,500 has been supplemented this year by one-half share in the income of the Edward Dean Adams Fund of $100,000.

Engineering Foundation, based on gifts from Ambrose Swasey, Honorary Member, American Society of Civil Engineers, and Honorary Member and Past-President, American Society of Mechanical Engineers, totaling (present par value of securities) $511,850; the income from the Henry R. Towne Engineering Fund (present par value $51,500), a legacy of $9,525 from the late Seeley W. Mudd, of Los Angeles, and one-half the income from the Edward Dean Adams Fund of $100,000. The total net income of the Foundation for 1927 from these sources will be $29,700.

The Foundation continues to pursue the policy adopted in December, 1925, and has given chiefly to the following projects, endorsed by the societies: Arch dam investigation, steel columns (for bridges and buildings), concrete and reinforced concrete arches, blast-furnace slags, strength of gear teeth, lubrication, dielectric absorption, engineering education (cooperating with S.P.E.E.), and fatigue of metals investigation, in cooperation with National Research Council and the University of Illinois.

Investigation of Engineering Education organized in 1923, through a gift of $108,000 by the Carnegie Corporation to the Society for the Promotion of Engineering Education, covered a three-year period of fact-finding, carried out with the active participation of the national engineering societies, engineering colleges, the U.S. Bureau of Education, National Industrial Conference Board, and others. The study and assembling of the

material is being now carried on with the aid of funds from the Engineering Foundation and the four Founder Societies.

American Engineering Standards Committee formed in 1917 by the Founder Societies and the American Society for Testing Materials, now includes representation from the Government Departments of War, Navy, and Commerce and about thirty-five other organizations of national scope, and shows a present list of projects, as follows:

Group	*Total*	*Approved*
Civil Engineering and Building Trades	37	19
Mechanical	63	21
Electrical	40	11
Automotive	4	3
Transportation	10	9
Shipbuilding	1	0
Ferrous Metallurgy	8	7
Non-Ferrous Metallurgy	14	10
Chemical	12	10
Textile	3	1
Mining	19	6
Wood	5	3
Pulp and Paper	2	1
Miscellaneous	22	5

A total of 240 projects has been submitted, of which 106 have been approved.

Engineering Societies Employment Service was formed in 1918. Previous to that time separate service was rendered by the individual societies.

On September 1, 1923, on the recommendation of a Joint Committee, the Boards of the Founder Societies made the Service cooperative, those obtaining positions contributing part of the cost of operation. Under the cooperative plan it has been possible to make the Service national in scope.

The Employment Service is conducted by the National Board of Management, composed of the Secretaries of the Founder Societies. Branch offices have been established in Chicago and San Francisco.

The New York office is administered by the Assistant Secretaries of the Founder Societies, acting as a local Advisory Board. This office during the year was put on the same basis as the other offices.

The Chicago office is administered by an Advisory Board composed of one representative from the Chicago Local Sections of the Founder Societies, and the Secretary of the Western Society of Engineers.

The San Francisco Office is administered by an Advisory Board, composed of a representative from each of the Local Sections of the Founder Societies, the California Section of the American Chemical Society, and the Engineers' Club of San Francisco.

American Engineering Council for 1927 has had as its President Dean Dexter S. Kimball, Past-President of the A.S.M.E. There are 19 representatives on the assembly of the American Engineering Council, six of whom have served on the Administrative Board; President Schwab is Chairman of the A.S.M.E. delegation.

Among the important projects receiving attention by the American Engineering Council during 1927, are:

Inventory of Water Resources — The Newton Bill, introduced in the beginning of the second session of the 69th Congress, provides for a twenty-year intensive activity on the part of the Water Resources Branch of the U. S. Geological Survey.

Patent Office — In the last annual report reference was made to the work of the Committee on Patent Office Procedure. During 1927 many of the recommendations of the committee have been put into effect. The last session of Congress also made a number of changes in the law relating to patents. These changes have been referred to by those conversant with the patent system as being more beneficial than any legislation relating to the Patent Office in the last twenty-five years. Enlarged and better quarters are to be provided in the new Department of Commerce Building, the erection of which is to be undertaken in the next few months. A proposal is pending before the Personnel Classification Board for advancing the rank of Patent Examiners one station, which will give them a material increase in salary, to improve correspondingly personnel conditions.

Proposed Uniform Mechanics Lien Act — Some months ago the Department of Commerce organized a truly representative committee to undertake a study of the Mechanics Lien Act. This committee has drafted a proposed Uniform Mechanics Lien Act which is in process of refinement, and contemplates that such an Act will bring about a very much improved condition in regard to mechanics liens. The American Engineering Council is represented on this committee.

Public Works — The Council has been active for some time in the interest of securing a Department of Public Works and Domain wherein would be concentrated all of the architectural, engineering, and construction activities of the Federal Government. Recently, it has been decided to revise the plan, and with this decision there will be introduced in the next session of Congress a bill proposing that instead of a department that there be a bureau and that all the architectural, engineering, and construction services of the Government be transferred to the Department of the Interior and be administered by an assistant secretary qualified by training and experience to direct such technical services.

Street and Highway Safety — The Council is represented on the major committees of the Hoover Conferences on Street and Highway Safety; in addition, at the suggestion of the Conference, the A.E.C. is about to complete a study of street signs, signals, and markings, to bring about a uniformity of practice in relation to such traffic devices.

Safety and Production — An engineering and statistical study of safety and production has been completed. It covers the experience of some fourteen thousand plants employing approximately two and one-half million workers. It will disclose many important and significant findings relating to safety and production. It is expected that the report will be issued in book form early in January.

Cooperation with Other Agencies — The American Engineering Council has continued its policy of cooperation with national movements such as elimination of waste, standardization, and simplification, which are being participated in by numerous engineering, industrial, and commercial organizations. The Council has also had representatives attend numerous important conferences relating to forestry, stream pollution, conservation of natural resources, safety and production, management, etc.

Mississippi River — Close contact has been maintained with those in responsible authority relating to the Mississippi River problem. A committee has been formed of men thoroughly conversant with flood control and will represent the A.E.C. at all Congressional hearings relating to this matter.

National Hydraulic Laboratory — The Ransdell Resolution, proposing the establishment of a national hydraulic laboratory, received the active

support of the American Engineering Council in the last session of Congress. This measure, like the Newton Water Resources Bill, has a very important bearing upon the Mississippi River problem and preliminary work has been done looking toward having a suitable bill drafted and introduced as soon as Congress convenes.

Radio — The Council's Committee on Radio Broadcasting participated in hearings held by the Federal Radio Broadcasting Commission last spring. This committee's report became the basis of most of the discussion by the Government committee. A very large number of the major recommendations promulgated by the Commission have been in complete accord with the recommendations of the Council's Committee.

Special Appointments and Exchange of Courtesies

In addition to the regular appointments each year and intersociety relations the president during his administrative year is called upon to make appointments of honorary vice-presidents in response to special invitations from universities, associations, special congresses, and similar interests.

For the term of office of President Schwab we have had approximately 100 such appointments, including the following:

The Society continues representation on the American Association for the Advancement of Science; Joseph A. Holmes Safety Association; Division of Engineering of the National Research Council; and Washington Award of the Western Society of Engineers, and has other special representatives on:

National Committee on Metals Utilization, Department of Commerce, Stanley G. Flagg, Jr.

National Conferences on Street and Highway Safety, Department of Commerce, E. J. Posselt.

National Research Council, Highway Research Committee, H. de B. Parsons.

National Screw Thread Commission, Luther D. Burlingame.

International High Commission, Advisory Committee to the U.S. Section, concerned with a preliminary study and compilation of a report on the use of Uniform Weights and Measures, R. E. Flanders.

U.S. Shipping Board, Fuel Conservation Board, H. L. Seward.

National Safety Council, American Society of Safety Engineers, Engineering Section, Study of Low Voltage Electrical Hazard, John Price Jackson.

International Electro-Technical Commission, W. F. Durand, F. R. Low, C. Harold Berry.

Committee on Standardization Survey, Charles M. Schwab, with H. Birchard Taylor as alternate.

Representations on special committees of the American Welding Society and the American Bureau of Welding: Fusion Welding for Pressure Vessels, W. F. Durand, R. L. Daugherty, E. R. Fish, Sherwood F. Jeter, and D. S. Jacobus; Gas Welding Committee of the American Bureau of Welding, James Partington and C. W. Obert; American Bureau of Welding Advisory Board to the National Research Council, James Partington; Structural Steel Welding, Advisory Committee to the American Bureau of Welding, Geo. A. Orrok.

The outstanding impression which a member of the Council gets from a year's service is the increasing complexity of the Society's interests and the purview of the Society, extending not only to a large number of subjects but to other countries concurrent with the greater influence of the United States in world affairs. It has been the aim of the Council perhaps to lead in some respects in the official participation of the United States, due to the Society's greater freedom and to the universal language and common interests of the engineer, for there seems to be an opportunity peculiar to the professional man, and in turn for the organizations of the profession, to bring about a better understanding between nations.

With the development of means of communication and of transportation, both of which are strictly engineering functions, the Engineering Societies are more and more becoming veritable ambassadors of good will in the pursuit of their work in advancing the arts and sciences.

CALVIN W. RICE,
Secretary.

General Information

THE historical facts presented in the following pages cover the year 1927, but general information, particularly concerning the publications of the Society, has been revised so as to be applicable to conditions existing in 1928.

HISTORY AND SCOPE

The American Society of Mechanical Engineers was organized in 1880 and chartered under the laws of the State of New York in 1881. Its headquarters are located in the Engineering Societies Building at 29 West 39th Street, New York, N. Y.

The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

CONSTITUTION, BY-LAWS, AND RULES

A new Constitution was adopted in 1922, and amended in 1924 and 1926. The By-Laws and Rules have been correspondingly revised. The complete Constitution, By-Laws, and Rules appear elsewhere in this volume.

ADMINISTRATION

Council and Officers, and Their Election

The Society is governed by its Council under the provisions of the Constitution. The Council consists of twenty-two members elected by letter-ballot of the membership of the Society, from nominees selected by the Regular Nominating Committee. The membership of the Council for 1927 is given on page 69.

The officers of the Society consist of the President, the Vice-Presidents, and the Treasurer. The Treasurer, and also the Secretary, are appointed by Council. The 1927 personnel will be found on page 69.

The *Regular Nominating Committee* is selected annually by delegates of the Local Sections to the Annual Meeting, and is confirmed by the Society in open session at this meeting. The Nominating Committee solicits suggestions for nominees for Council from the membership and makes its selection after conferences and open sessions at the Spring Meeting. Other nominating committees having

the same powers may be constituted by the membership of the Society as provided in the By-Laws.

The Regular Nominating Committee for 1927, together with the grouping of the Local Sections through whose delegates it was selected, is given on pages 72-73.

Committees

The Council is assisted by administrative and technical committees, both standing and special, represented without vote on the Council by their chairmen.

The *Committee on Constitution and By-Laws,* under direction of the Council, has supervision of matters affecting the Constitution, By-Laws, and Rules, and reports on all matters in this connection referred to it by the Council. It does not institute policies. The personnel of this committee for 1927 will be found on page 70.

The *Finance Committee,* the personnel of which for 1927 is given on page 70, has supervision of the financial affairs of the Society. These cover the receipt and disbursement of funds, including moneys received from the membership, income secured from publications and sales activities, contributions for special purposes, such as research and standardization, and special trust funds.

Subsequent pages present information concerning the work and personnel of other committees.

MEMBERSHIP

All matters of admission of new members, of transfer of members from one grade to another, and of terminations of membership are in charge of the Membership Committee under the direction of the Council. The personnel of this Committee is given on page 70.

Admission to the Society

The constitutional requirements for admission to this Society are included in Article C4, Sections 3 to 6, of the Constitution.

Application for admission must be made upon a form which may be obtained from the Secretary or from officers of Local Sections. This form provides for a statement of the standing and professional experience of the applicant and requires references from a specified number of members personally acquainted with the applicant in his engineering work, according to the grade applied for. Local Sections officers will cooperate with members desiring to assist engineers in making application for membership in the Society.

Procedure for Election

Upon receipt of the application by the Secretary, the name and title of each applicant is posted in the *A.S.M.E. News,* thereby giving the membership opportunity to forward to the Membership Committee information regarding candidates. Candidates must be posted at least 30 days before their election can take place. Meanwhile, the Membership Committee considers the qualifications of the applicant, and the statements made by those members to whom he refers on his application and by any others who may address the Membership Committee as a result of the posting of the candidate's name; if it finds the applicant qualified within the requirements of the Constitution, it makes a recommendation to the Council in the form of a letter-ballot as to the grade to which the applicant should be assigned. The Council votes on such a matter within 30 days after the letter-ballot is sent and candidates receiving favorable action are notified of their election.

An initiation fee and dues for the proportion of the Society's fiscal year which begins October 1 are payable upon notice of election; thereafter, dues are payable annually in advance on the first of October. Upon election new members are assigned to the nearest Local Section.

Membership Privileges

The benefits of membership depend in a large measure on the amount of personal interest taken by the individual. The dues in themselves entitle the member to the following publications: The sections of Transactions for those Professional Divisions in which he is registered; the monthly journal of the Society, *Mechanical Engineering,* and semi-monthly *A.S.M.E. News;* and the annual Record and Index, Membership List, and Condensed Catalogues; the right to wear the official badge of the Society, which may be obtained from the Secretary; and the right to use after his name the approved abbreviations denoting his connection with the Society, as follows:

Honorary Member	Hon. Mem. A.S.M.E.
Member	Mem. A.S.M.E.
Associate	Assoc. A.S.M.E.
Associate-Member	Assoc-Mem. A.S.M.E.
Junior	Jun. A.S.M.E.

However, a member who puts *himself* into the Society by attending meetings, serving on committees, both national and local, presenting papers or taking part in discussions, etc., receives a return on his investment, which, in the opinion of some of the older members, is of inestimable value.

INSIGNIA

The design of the seal of the Society is based on the saying which is attributed to Archimedes δὸς ποῦ στῶ καὶ τὸν κόσμον κινήσω (Give me where to stand and I will move the earth).

The official badge of the Society is a four-leaf clover design bearing the Society's initials. The badge for Honorary Members, Members, Associate-Members and Associates is in dark blue enamel, with letters in bright gold. The Junior badge is in crimson enamel. Student Associates may wear a student pin, which combines the Society's official badge and the colors and initials of his college.

The badge is supplied in two sizes, the small one being the size here shown, and the large about twice this size. Forms of the large size are catch-pin back for wearing on coat lapel or vest, stick pin, and double-faced charm for watch fob or chain. Forms of the small size are catch-pin back and screw back. Prices of the official badge may be obtained from the Secretary.

MEETINGS

Through its meetings the Society offers opportunities for members to gather and discuss the latest developments and newest thought in mechanical engineering and to gain the stimulus of contact, the excitation of one's mental processes, that come from personal participation in the activities of his professional group. Not the least of the advantages which attendance at a meeting gives is the excellent opportunity for making friendships and developing professional fellowship.

The Committee on Meetings and Program, which is listed on page 70, has supervision of the Annual, Spring, and Regional Meetings of the Society, and cooperates with the Professional Divisions and the Committee on Local Sections in regard to the National Meetings. The meetings held during 1927 are reported elsewhere in this volume.

Scope

The broadening scope and activity of the Society is reflected in the programs for Society meetings which include not only technical sessions, entertainment and excursion events, but many committee meetings, public hearings and gatherings of allied bodies. The meetings are the great clearing houses of experience and knowledge in the mechanical-engineering field, and every member is sure to find much of interest and inspiration in the programs.

Spring and Annual Meetings

General Meetings of the Society, conducted by the Committee on Meetings and Program, with the assistance of specially appointed sub-committees, are held each year. The date and place of the Spring, or Semi-Annual, Meeting is determined by the Council. The Annual Meeting must begin in New York and continue there during the annual election of the directors, held on the first Tuesday in December. Further sessions may be held elsewhere, at the direction of the Council.

Business Meetings

Business meetings of the Society are held at the Annual and Spring Meetings, and at these sessions matters relating to Society policy and procedure may be publicly discussed.

Regional Meetings

Regional Meetings are of the same standard technically and socially as Annual or Spring Meetings. They differ only in that their program does not contain a business meeting of the Society.

National Meetings

National Meetings, conducted by the Professional Divisions with the cooperation of the Committee on Local Sections and Committee on Meetings and Program, are further referred to on page 41.

Papers for Meetings

That the high standard of the technical meetings may be maintained, papers submitted to the Society should as far as possible present (1) new facts, methods of procedure, or principles of undoubted value; (2) results of intelligently planned, original, experimental researches; (3) important conclusions from known facts regarding any particular subjects reviewed by the author.

The preparation of a technical paper, complete with tables and illustrations, may be a complicated task. A pamphlet of Suggestions to Authors, which may be had upon application to the Secretary, will be found of considerable assistance, and these, if followed, will greatly reduce the amount of editorial work necessary on a paper, and will expedite its publication.

As the technical sessions are generally arranged in cooperation with the Professional Divisions of the Society, papers may be submitted through the various Divisions or directly to the Secretary of the Society who will refer them to the proper Division.

Discussion

Manuscripts are required to be in hand at least two months before the meeting at which the paper is to be presented. This gives the necessary time to have it preprinted and distributed for discussion, which is essential to the success of a technical session. Discussion to be valuable must be directly pertinent to the subject of the paper. It should be concise and definite. Its purpose should be either to confirm or correct, in the light of personal experience, definite results or conclusions which the author is presenting.

PUBLICATIONS

The Society's publications, the most obvious service to the member, perform an important function in carrying out the purposes of the Society. They announce and record its activities, technical and professional, completed or proposed; they are the means of communication between the active committees and the remainder of the membership, as well as the source of information and inspiration in carrying out the broad program of the Society.

A new publication policy which went into effect January 1, 1928, provided for changes in Transactions, *Mechanical Engineering*, and the Membership List, and instituted a new publication, the Record and Index. The new procedure is outlined below. The personnel of the Publications Committee, which has supervision of publications, is given on page 70.

Transactions

The Transactions, containing selected papers and discussions presented at meetings of the Society and of its Divisions and Local Sections, is issued in sections. The material is grouped according to the special interests of the Professional Divisions of the Society, and distributed on the basis of registration in Professional Divisions. Members with varied interests are permitted to register in a maximum of three Divisions, and receive the Sections of Transactions covering those Divisions.

Mechanical Engineering

Mechanical Engineering, published monthly, contains original contributions, addresses, papers, and discussions presented or to be presented at meetings of the Society, and of current value; abstracts of the Transactions papers of more general interest; editorials by engineers upon subjects of timely interest; abstracts of important articles appearing in current issues of the world's technical press; The Engineering Index, a well-known technical service; the Confer-

ence Table, a department designed to allow members to exchange information and opinions with other members; correspondence on matters of engineering interest; synopses of all papers appearing in the Professional Division Sections of Transactions; notes of the Engineering Societies Library, book notices, reviews by experts, etc.

Mechanical Engineering is mailed to every member in good standing on the twenty-fifth of the month preceding the month of issue.

A.S.M.E. News

The *A.S.M.E. News,* published semi-monthly, is a convenient method of informing members upon all current Society matters, including activities of Council, committees, Professional Divisions, Local Sections, members' correspondence, candidates for membership, engineers available, etc.

The *News* is issued to members in good standing on the seventh and twenty-second of each month.

Record and Index

The Record and Index is published annually and issued to all members. It is bound in half morocco, uniform with the Transactions as issued up to 1927. It contains a portrait of the President and his presidential address; the annual report of Council and committees; general information concerning the Society; personnel of Council and committees, list of technical sub-committees, and representatives on joint activities; reports of Spring, Annual, Regional, and National meetings; index, with brief abstracts, of papers presented at these meetings and at Local Section meetings, if published, and of published findings of technical committees; necrology; Constitution, By-Laws, and Rules; and other information selected by the Publications Committee.

Membership List

A Membership List, formerly issued as the Year Book, is issued in February of each year to every member in good standing who requests it, and contains the list of members arranged geographically and alphabetically, corrected to January 3.

Condensed Catalogues of Mechanical Equipment

Condensed Catalogues is published annually and mailed about September 30 of each year to all members in good standing. It combines in one volume a complete classified list of manufacturers of mechanical equipment, a list of consulting engineers, and catalogue information of firms making all kinds of mechanical equipment.

Biographies

Subscription editions of the lives of several engineers have been offered to members of the Society during the past few years. These books constitute important additions to the literature of the profession. The titles and dates of issue are as follows:

1912—The Autobiography of John Fritz
(Trade Edition, by John Wiley & Sons)
1921—The Life of George Westinghouse, by Henry G. Prout
(Trade Edition, by Charles Scribners' Sons)
1923—Frederick W. Taylor, by Frank Barkley Copley
(Trade Edition, by Harper & Brothers)
1924—John A. Brashear, an Autobiography
(Trade Edition, by Houghton Mifflin & Co.)
1925—The Life of John Edson Sweet, by A. W. Smith
1927—The Life of Walter C. Kerr, by A. W. Smith

The Engineering Index

The Engineering Index Service offers a complete weekly card index and concise digest of the leading domestic and foreign technical periodicals covering every phase of engineering activity. Approximately 1700 publications representing 37 countries and published in 17 languages are reviewed each week by a staff of experts operating under the supervision of the Publications Committee. In addition to the card service the Index appears in volume form each year.

Reprints, Reports, Codes, Etc.

Members may obtain from the Publication Sales Department of the Society lists giving titles and prices of the various publications that are on sale to members and others who desire them. These publications include reprints of papers presented before the Society, usually with the discussion, and reports of technical committees, including the Boiler Code, Power Test Codes, Safety Codes, and Standards.

PROFESSIONAL DIVISIONS

Make-up, Purpose, Duties, and Organization

A Professional Division is an organization of members of the Society on the basis of common interest in a branch of engineering, within the scope of the Society.

A Professional Division's principal function is the presenting and stimulating of developments in mechanical engineering in its field, principally through four phases of activity: (*a*) National Division Meetings; (*b*) Sessions at Society Meetings; (*c*) Annual Progress Report; and (*d*) Surveying for Research.

Membership

Any member of any grade may register in not more than three Professional Divisions. He will be kept informed of the activities of all Divisions by means of the publications and meetings of the Society, and will receive automatically the sections of Transactions containing all printed papers of the Divisions in which he has registered. Those who register in a Division should render active service in the Division.

Organization

The Standing Committee on Professional Divisions, listed on page 70, is the point of contact for the Divisions with Council and with each other. It exercises general supervision over the work of all Divisions.

Each Division has an Executive Committee which is its administrative body. This committee consists of five members, each appointed for five years by the President of the Society, one member retiring each year. The Executive Committee plans the work of the Division, appoints such sub-committees as may be necessary to carry out the purposes of the Division, and directs their work. The personnel of the executive committees and sub-committees of the Professional Divisions for 1927 was given in the Year Book.

General Activity of Professional Divisions

National Meetings

The Professional Divisions are authorized to conduct national divisional meetings in cooperation with the Standing Committee on Local Sections and the Committee on Meetings and Program. Such meetings are required to be of a quality comparable to that of the Annual, Spring, and Regional Meetings. These meetings are for the purpose of giving all members of the Society who have a common interest in some particular phase of engineering, the opportunity to meet and discuss the problems arising in that field.

Sessions at Society Meetings

Annual, Spring, and Regional Meetings are functions of the Society as a whole and it is one of the duties of the Professional Divisions to aid in arranging the technical sessions for these meetings, in cooperation with the Committee on Meetings and Program. The Divisions also aid Local Sections in securing speakers and writers on specialized technical topics and those of general interest within the field of the Division.

Annual Progress Reports

Each Division prepares annually a Progress Report which gives an accurate account of mechanical engineering developments in its field. These Progress Reports are presented at the Annual Meeting, and furnish information upon which a future program can be developed.

Surveying for Research

Each Professional Division conducts, usually through a subcommittee, a survey of its field as to the need of research, standardization, and test codes. A Division is in a position to learn of the existing gaps in knowledge, and the steps that are under way to fill these gaps.

Where a particular project appears desirable, it is the duty of the Division to demonstrate the need for it, canvass the personnel and research laboratories which should be interested in it, and cooperate with the Standing Committee on Research in presenting a definite project to the Council in accordance with the rules provided for such procedure.

General Service

Each Professional Division endeavors to have active cooperative relations with other technical societies or trade associations touching on the field of the Professional Division so as better to coordinate activities in its field. Many Divisions have other functions, in the form of general service to the public or to the engineering profession. Excellent examples of this are: the smoke abatement work of the Fuels Division, part sponsorship of Management Week by the Management Division, Professional Service Committee of the Railroad Division, etc.

LOCAL SECTIONS

Definition and Purpose

A Local Section is an organization of the members of the Society in a given territory whose objects are to promote the professional ideals of the Society, as well as to stimulate personal contact and acquaintanceship among the members in the territory.

In 69 important industrial centers throughout the country the members have now organized Local Sections. In addition to their professional and social activities, these Sections participate in the government of the national organization. In electing officers of the Society, each Section selects a delegate to a Conference of Local

Sections' Delegates held during the Annual Meeting in New York, which in turn selects the Regular Nominating Committee.

Organization of a New Section

After obtaining the Council's approval of a Section, a group of members call for an organization meeting of all members of the A.S.M.E. of the locality and temporary officers are chosen to take charge of the Section's activities.

Operation of Sections

Each Section is allotted a territory dependent upon the population and geography of the portion of the country in which it is situated. The membership of the Section selects by vote an executive committee and other officers. This executive committee, or the chairman thereof, has the power of appointing sub-committees. The activities of the Section are financed through appropriation from funds of the national Society.

Members of the Society, no matter where located, are assigned to Local Sections without being obligated to expense in addition to the regular dues. However, dues are sometimes assessed by Sections themselves on local members to provide for greater activities, but these dues are not mandatory.

Through the Sections, the activities of the Society are brought to the door of the members. Through local sub-committees there is opportunity for contact with all of the national activities of the Society, including its various Professional Divisions, its technical committees engaged in research and standardization, the development of codes outlining standard professional practice, etc. Incidentally, through the Sections, opportunities are provided for contact with the activities of other organizations and societies, such as the American Engineering Council, National Research Council, the preparedness movement of the Army and Navy of the United States, and professional allied organizations. Participation is also afforded in engineering movements of a national character, such as laws for the licensing and registering of engineers, creation of a major Division of Public Works within the Department of the Interior, etc.

Regional Meetings

With the great increase in the number of members all over the United States, the need for more than two annual meetings of national importance has become evident. This has resulted in the authorization of Council of Regional Meetings conducted under auspices similar to

the Annual and Spring Meetings, and partially financed from national funds. Regional Meetings are held in different sections of the country with several Local Sections cooperating in the development of the program.

Local Engineering Societies

With the multiplicity of engineering organizations, Local Sections are encouraged to affiliate with local engineering societies in order to avoid a duplication of effort and conflict in meeting dates, and at the same time enable the National Societies through their respective Local Sections in the various cities of the country to support both morally and financially the development of local engineering activities. This procedure provides concerted action in each community by engineers of all branches of the profession.

Administration

The 1927 personnel of the executive committees, date of organization, meeting place, affiliated organizations and other data regarding each of the localities where Sections are established, were given in the 1927 Year Book. The personnel of the Standing Committee on Local Sections, which has supervision of the Local Sections throughout the country, appears on page 70.

STUDENT BRANCHES

Definition

A group of students of mechanical engineering in a school or college of accepted standing may petition the Council for the formation of a Student Branch or for the affiliation of a student-engineering society of the A.S.M.E. Mechanical-engineering students in such societies shall be regarded as Student Associates of this Society.

The object of the formation of Student Branches is to enable the engineering student to obtain a conception of the organization and operation of engineering societies, and therefore, outside of a few simple rules, Student Branches enjoy almost complete autonomy.

A Student Branch may be established in an engineering school which has the following requirements: A preparation for entrance of four years at high school or its equivalent; an adequate staff for teaching mechanical engineering; at least one member of the faculty a member of The American Society of Mechanical Engineers; an equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering; a course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering.

Activities and Privileges

Student Branches have opportunity to cooperate in a number of the Society's activities. They are encouraged to hold joint meetings with other Student Branches in their vicinity or with the Local Section of the Society. Student Associates are accorded the same privileges as A.S.M.E. members in the matter of securing a discount on publications purchased from the Society. In order to encourage the writing and presenting of papers by students, the Society, through the generosity of one of its members, has been able to offer each year an award as well as a certificate of award for the two best papers submitted by members of Student Branches. Upon graduation, Student Associates are assisted in the matter of securing employment and forming contact among engineers of the United States or other countries.

In addition to the opportunity afforded the student for development in the art of presenting orally engineering matters before an audience, speaking extemporaneously and stating a proposition clearly and convincingly, the student has the privilege of wearing a student pin, combining the Society's official badge and the colors and initials of his college, and of using a membership card for introduction to engineering plants where members of the Society may be in authority and to serve as a means of identification at engineering meetings and elsewhere. He also enjoys the privilege of attending the general meetings of the Society, going on excursions, and participating in other invitation features afforded to regular members.

The personnel of the Committee on Relations with Colleges is given on page 71 and the list of ninety-two Student Branches and their officers were given in the 1927 Year Book.

AWARDS

The Committee on Awards, listed on page 70, makes recommendations to the Council on awards if the conditions of awards detailed in the rules of the Society so specify. Other awards are administered as specified in the deeds of gift or as may be determined by the Council from time to time.

Awards

1. *Honorary Membership,* to which highly distinguished engineers are elected by unanimous vote of Council. A list of recipients is given elsewhere in this volume.

2. *Life Membership,* which may be conferred by the Council for distinguished service to the Society.

3. *A.S.M.E. Medal* for distinguished service in engineering and science, so far awarded to John R. Freeman, Past-President, F. A. Halsey, R. A. Millikan, H. G. Carlson and Wilfred Lewis.

4. *Holley Medal,* endowed by George I. Rockwood, to be bestowed only on one who by some great and unique act of genius of an engineering nature has accomplished a great and timely public benefit. One award made, to H. G. Carlson.

5. *Melville Medal,* endowed by Rear-Admiral George W. Melville, Past-President and Honorary Member. Awarded for the best original paper or thesis of exceptional merit. One award made, to L. P. Alford, for paper on "Laws of Manufacturing Management."

6. *Junior Award,* a cash award of $50 for the best paper or thesis submitted by a Junior member. A fund created by the late Henry Hess.

7. *Student Awards.* Two cash awards of $25 each, established by the late Henry Hess, are given every year for the best papers or theses submitted by Student Associates.

8. *Charles T. Main Award.* A cash award of $150 for a paper by a student of engineering, preferably a member of a Student Branch of The American Society of Mechanical Engineers, for the best paper within the general subject of the Influence of the Profession upon Public Life. The exact subject is given out each September through the Honorary Chairmen of the Student Branches. The first subject related to the "Influence of the Locomotive on the Unity of the United States." The second year's subject was "The Effect of the Cotton Gin upon the History of the United States during Its First Seventy Years." The subject for this year was "The Effect of Scientific Management upon the Industries." (See also Appendices to the Rules, elsewhere in this volume.)

9. *The Max Toltz Endowment* of $15,000 given by Major Max Toltz, a was "The Effect of Scientific Management upon the Industries." (See

10. *Scholarship or Fellowship* offered by the Woman's Auxiliary to assist sons and daughters of members of the Society or worthy students of mechanical engineering.

11. *John R. Freeman Fund* of $25,000 for travel scholarships.

Recipients of Junior and Student Awards

Junior Awards

(Established in 1914. No awards in 1915, 1917, 1918, 1920, and 1926.)

1916—L. B. McMillan, Heating Insulating Properties of Commercial Steam Pipe Coverings

1919—E. D. Whalen, Properties of Airplane Fabrics

1921—S. Logan Kerr, Moody Ejector Turbine

1922—F. L. Kallam, Preliminary Report on the Investigation of the Thermal Conductivity of Liquids
R. H. Heilman, Heat Losses from Bare and Covered Wrought-Iron Pipe at Temperatures up to 800 Deg. Fahr.

1923—S. Crocker, and S. S. Sanford, The Elasticity of Pipe Bends

1924—R. H. Heilman, Heat Losses through Insulating Material

1925—Gilbert Schaller, An Investigation of Seattle as a Location for a Synthetic Foundry Iron Industry

1927—Wm. M. Frame, Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressures.

Student Branch Awards

(Established in 1914. No awards in 1915, 1918, and 1922.)

1916—Boynton M. Green, Stanford University, Bearing Lubrication
Howard E. Stevens, Rensselaer Polytechnic Institute, An Investigation of the Dynamic Pressure on Submerged Flat Plates
M. Adam, Louisiana State University, The Adaptability of the Internal Combustion Engine to Sugar Factories and Estates

1917—H. R. Hammond and C. W. Holmberg, Pennsylvania State College, Study of Surface Resistance with Glass as the Transmission Medium

1919—C. F. Leh, and F. G. Hampton, Stanford University, An Experimental Investigation of Steel Belting
W. E. Helmick, Stanford University, An Experimental Investigation of Steel Belting

1920—Howard G. Allen, Cornell University, Wire Stitching through Paper

1921—Richard H. Morris, and Albert J. R. Houston, University of California, A Report upon An Investigation of the Herschel Type of Improved Weir
Karl H. White, University of Kansas, Forces in Rotary Motors

1923—H. E. Doolittle, University of California, The Integrating Gate, a Device for Gaging in Open Channels
Chas. F. Olmstead, University of Minnesota, Oil Burning for Domestic Heating

1924—L. J. Franklin, and Charles H. Smith, Stanford University, The Effect of Inaccuracy of Spacing on the Strength of Gear Teeth
George Stuart Clark, Stanford University, Two Methods Used for the Determination of the Gasoline Content of Absorption Oils in Absorption Plants

1925—W. S. Montgomery, Jr., and E. Ray Enders, Jr., Pennsylvania State College, Some Attempts to Measure the Drawing Properties of Metals
Harry Pease Cox, Jr., Rensselaer Polytechnic Institute, A Study of the Effect of End Shape on the Towing Resistance of a Barge Model

1926—R. E. Peterson, University of Illinois, An Investigation of Stress Concentration by Means of Plaster of Paris Specimens
Cecil G. Heard, University of Toronto, Pressure Distribution over U. S. A. 27 Aerofoil with Square Wing Tips Model Tests

1927—Alfred H. Marshall, Princeton University, Evaporative Cooling
Roger Irwin Eby, University of Washington, Measurement of the Angular Displacement of Flywheels.

RESEARCH

Research in science and engineering is fast coming to be recognized as one of the most important factors affecting industrial progress. Since the Society's members are closely connected with and are leaders in this industry, it is natural that the A.S.M.E. should take an active part in the initiation and carrying on of research in the mechanical-engineering field. It can be particularly helpful in sponsoring those problems in applied research which are so widespread in application that no single firm feels justified in supplying the funds which should come from all those that would ultimately benefit. While the Society's

limited research budget does not permit of grants for the actual conduct of specific research projects, a stimulating and helpful influence is exerted through committee activity. To enumerate, the following important functions may be exercised: (*a*) act as a clearing house for the dissemination of research information; (*b*) coordinate existing research where possible, thus eliminating waste due to the duplication of effort; (*c*) organize and conduct cooperative research work on problems of both a fundamental and applied nature in engineering and industry; and (*d*) develop ways and means of assisting in the education and training of research workers for industry.

Development of A.S.M.E. Research Activities

More than twenty years ago the Society added research to the list of its activities. At that time a Research Committee was established by the Council and under its financial control. As time went on its organization and procedure gradually took on definite form and new possibilities for service developed. Special committees were formed to investigate specific problems.

It was not until the end of the World War, however, that a separate budget item for research was established by the A.S.M.E. Council. Since that time approximately $35,000 has been expended by the Main Research Committee in the development and organization of Special and Joint Research Committees and in other research activities. The success of its methods is attested to by the fact that in that time an additional $152,000 has been raised from industry by its committees for the support of their work, a ratio of nearly five dollars to one. The following brief facts furnish a comprehensive picture of A.S.M.E. research activities:

History

Main Research Committee appointed by Council...	1909
First research budget appropriated by Council (1919-1920)	$4,000

Present Status

Main Research Committee budget for 1926-1927....	$14,000
Authorized Special and Joint Research Committees organized by Main Research Committee.....	24
Research projects in process of development.....	12
Total membership of Special and Joint Research Committees	290
Number of men spending full or part time on actual research for these committees.....	70

Researches in progress at:

5 Government Laboratories	20 Industrial Laboratories
8 University Laboratories	4 Field Investigations

Research publications since 1919-1920..... 75

Organization and Procedure

Organization. The research activities of The American Society of Mechanical Engineers are organized and directed by a Standing Committee of the Council, the governing body of the Society, officially known as the A.S.M.E. Main Research Committee. The personnel of this committee is given on page 71.

The Council makes an annual appropriation for research from the funds of the Society and this money is used by the Main Research Committee to initiate, organize, and foster Special Research Committees whose problems cover the various fields of mechanical engineering and allied industries. A list of these special committees is given on pages 73-74. A small staff is maintained to assist in the detailed work of the Main Committee.

Program. The research program of the Main Committee is made up of projects which are originated by certain individuals or groups, the Main Committee itself, other technical committees of the Society, such as on Standards, Safety, and Power Test Codes, or the recently formed Survey Committees of the A.S.M.E. Professional Divisions. It is the function of these Survey Committees to canvass the needs of their particular field for research and to bring these needs to the attention of the Main Research Committee in the form of definitely outlined research projects which will advance the art of mechanical engineering and will commend themselves to financial support by industry.

Procedure. Following the authorization of a proposal as an A.S.M.E. research project by the A.S.M.E. Council, the Main Committee organizes a Special Research Committee of interested and qualified individuals both from among those industries which have already indicated their interest in the project and from among those individuals whose knowledge and experience particularly fit them to advise on the technical aspects of the committee's activities. Membership and work on these committees are entirely voluntary and are not limited to those who hold membership in the A.S.M.E. Each Special Committee acts as a clearing house of information on its particular subject, maps out an investigational program, carries on a financial campaign throughout the interested industries for support of its projects, and employs and supervises the work of research fellows who are established in university, government, or industrial laboratories.

Cooperation with Other Research Agencies

Oftentimes research can be most effectively undertaken through the joint efforts of several technical societies. Where greater effectiveness

seems assured, therefore, this Society joins with other technical organizations in the sponsorship of such a project. Close contact with the National Research Council and Engineering Foundation is maintained through A.S.M.E. membership on the boards of these research agencies.

STANDARDIZATION

Purpose

The growth of the standardization activities of the Society has been a direct result of the demand for engineering and industrial standards and for information about them on the part of our membership. This department now endeavors to encourage the development of standards in the mechanical-engineering field, to assist in this work through the organization and functioning of representative committees, and to keep the members of the Society fully informed concerning all standards activity.

Brief Historical Note

The early records of the Society show that five years after it was founded (1885) a Standardization Committee on Pipe and Pipe Threads was appointed. This Committee made its report the following year and from that time standards committees have been almost continuously at work. In 1892 the first report on the standardization of pipe flanges was published. It was revised and republished in 1900 and was again revised and extended during the years 1912-1914 and 1916-1918. As far back as 1901 another committee of the Society developed and printed a complete standard for pipe unions.

In the early days before the organization of the American Society for Testing Materials, the Society had committees at work developing standard tests and methods of testing materials. The first report of this kind was published in 1890.

The standardization of screw threads has received the attention of numerous committees, the first of which reported in 1907 on standard proportions for machine screws. Special threads for electric fixtures and fittings were covered by two reports published in 1915, and three years later (1918) a comprehensive report appeared on the standardization of limits and tolerances in screw-thread fits. Finally this preliminary work had its culmination in the report of the Sectional Committee on the Standardization and Unification of Screw Threads which was published in 1924 under the title Screw Threads for Bolts, Machine Screws, Nuts and Commercially Tapped Holes.

The diversity of the Society's interest in this field is shown by the fact that the list of standards developed by its early committees

includes those for pipe threads; abbreviations, symbols, punctuation, etc., in technical papers (1904); code for identification of power-house piping (1911); catalogue sizes (1913); pipe-thread gages (1913); mechanical filters (1916); and standards for graphic presentation (1917).

With the establishment of the American Engineering Standards Committee the scope of the Society's activities in Standardization were broadened to include such projects as Shafting Diameters and Keys, Metal Fits, Ball Bearings, Gears, Screw Threads, Pipe Flanges and Fittings, Bolt, Nut and Rivet Proportions, Small Tools and Machine Tool Elements, Drawings and Drafting-Room Practice, Wire and Sheet Metal Gages, Wrought Iron and Wrought Steel Pipe and Tubing, and Electric Motor Frame Dimensions.

Organization and Function of American Engineering Standards Committee

The American Engineering Standards Committee, organized in 1918, serves as the national clearing house for engineering and industrial standardization, acts as the official channel of cooperation in international standardization, and provides an information service on engineering and industrial standardization matters. The ultimate responsibility for and control of the work rests with the thirty-six national organizations whose representatives constitute the American Engineering Standards Committee. The Society is one of these member bodies, having been one of the five founder societies.

The A.E.S.C. approval of a given standard means that a national consensus has been reached. It is, therefore, the agency through which industrial standardization in this country is passing from standardization by associations, societies, and governmental agencies, to standardization on a national scale. Through its method and procedure, which are the result of extensive study and discussion on the part of the numerous bodies concerned, and which have been further developed through nine years of experience, the standardization work of the many bodies concerned is being broadened and unified into a system of creating national industrial standards.

A.S.M.E. Standards Organization

Realizing the growing importance of this branch of the Society's activity the Council in 1911 created the standing Committee on Standardization and placed at its head that pioneer in this field, Henry Hess, who served until his death. It is the duty of this Committee to receive all proposals for the development of standards, to initiate projects, to keep the Council fully informed on standardi-

zation matters of interest to A.S.M.E. members in general, and to organize and pass on the work of Sectional Committees which now function under the procedure of the A.E.S.C. (See page 71 for personnel of committee.)

Relations with Other A.S.M.E. Activities

Through the pages of *Mechanical Engineering* the Main Standardization Committee endeavors to keep the membership fully informed on the developments in its field in the United States and foreign countries. One of the steps in the procedure for approving reports, standards, and codes by the Society requires their publication in *Mechanical Engineering* in full or in abstract. In addition to this publicity, hearings on certain important standards or codes are often called.

Financial Support

The small annual appropriations which are made for standardization serve to cover only the executive work necessary for the carrying through of the various projects for which the Society has accepted sponsorship or joint sponsorship, and to take care of the volume of correspondence incident to this work.

It is accordingly necessary at times for the Main Committee to call on the manufacturers and principal users of a product undergoing standardization for assistance in covering the incident expenses. A notable example of this is the contribution of $2000 by the bolt, nut and rivet manufacturers for the support of the activities of the Sectional Committee on the Standardization of Bolt, Nut and Rivet Proportions.

Present Projects

The list of standardization committees which is given on pages 75-77, indicates the projects which are now occupying the attention of this group of workers.

POWER TEST CODES

Scope of the Codes

The purpose of the Power Test Codes is to provide standard directions for conducting and reporting performance tests of power-plant and heat apparatus, such as are most commonly undertaken in connection with commercial transactions. They are sufficiently comprehensive to apply to tests which determine all the details of the

performance, but selected parts of these Codes may be used for tests of limited scope. They apply further to tests which concern the fulfilment of performance guarantees, and to acceptance tests.

The Codes are not intended to supply directions for general research or the development of equipment or of processes, but to assist the engineer who is concerned with research to proceed as nearly as practicable in harmony with their requirements and, in the publication of results, to employ forms of presentation which will be comparable with those of the Codes.

Historical Note

In 1886 a committee was appointed to formulate a code entitled a Standard Method for Steam Boiler Trials which soon became the standard practice of the profession and the basis upon which performance guarantees were drawn and settled. At that time there were no other recognized rules for practice extant in this country. This A.S.M.E. Code was revised in 1899 and has since undergone several other revisions made necessary by the progress of the art. The Institution of Civil Engineers of Great Britain appointed a similar committee on Tabulating the Results of Steam Engine and Boiler Trials in 1897, and its report, made in 1902, is now under revision by a Joint Committee of the Institutions of Civil and Mechanical Engineers.

Test Codes for prime movers soon followed. The Standard Method of Conducting Duty Trials of Steam Pumping Engines was published in 1891, the Code for Locomotive Tests appeared in 1893, and the report on a Standardized System of Testing Steam Engines was published in 1902.

Revision of Codes

A comprehensive and thorough revision and extension of the A.S.M.E. Test Codes was begun in 1909 and completed and published in 1915. This group of Test Codes is entitled Rules for Conducting Performance Tests of Power-Plant Apparatus, and covers the testing of boilers; reciprocating steam engines; steam turbines; pumping machinery; compressors, blowers and fans; complete steam-power plants; locomotives; gas producers; gas and oil engines; and waterwheels.

In the fall of 1918 the Council, realizing the need for a further revision and extension of these Test Codes, created a Standing Committee of 25 men for this purpose. This Main Committee with its 20 associated individual committees was organized in December of that year. (See pages 71 and 77.)

Plan of Committee Organization

The Main Committee formulates the plan and scope of the work, determines what codes should be developed, nominates persons for appointment by the President as members of the committees charged with the development of the individual codes, and suggests revisions if necessary to correlate their work with that of the other committees and with the general plan. When a Code submitted by an individual committee is complete and satisfactory, the Main Committee transmits it to the Council with its recommendations, and when approved by the Council the Code is published as the A.S.M.E. Code on that particular subject over the signatures of the members of the individual committee which formulated the Code and becomes the standard practice of the Society. Dr. Fred R. Low (Past-President) is the chairman of this Standing Committee.

The members of the individual committees have been selected with special reference to their knowledge of the various subjects, as it is the Society's expectation that the codes when issued will embody the best thought and experience of the profession. The choice of members has not been confined to men who are members of the Society. Knowledge of the subject is considered more important than society affiliation. The members of the individual committees are widely distributed geographically so a great part of their work is carried on by correspondence, it being impracticable for the Society to reimburse those who are engaged in its committee work for expenses incurred in attending meetings.

The committees are favored by the cooperation of other societies. For example, the Committee on Centrifugal and Turbo-Compressors and Blowers, in the development of its Code, has had the full cooperation of the American Society of Heating and Ventilating Engineers and the National Association of Fan Manufacturers; the Committee on Refrigerating Systems is identical in its membership with the committee appointed for a similar purpose by the American Society of Refrigerating Engineers; and the Mechanical Division of the American Railway Association is officially represented on the Committee on Locomotive Tests. Other individual committees include representatives from the U. S. Bureau of Standards, the U. S. Naval Academy Testing Station, the U. S. Bureau of Mines, the Machinery Builders Society, and the Hydraulic Society.

The individual committees have chosen their own officers and have perfected their own organization. They are free to seek the cooperation of every individual and organization having information upon or interest in their respective Codes, especially those whose interests will be affected by these Codes. The Committee on Reciprocating

Steam Engines, for example, wrote to 120 engine builders, telling them that the Steam Engine Code was to be revised, and solicited their suggestions and interest. The committees may avail themselves also of the cooperation of other societies or committees interested in their Codes. Should they desire to add to their membership or to invite an organization to participate in their work by the appointment of representatives upon their committees, recommendations are made to the Main Committee, which transmits such recommendations to the Council for invitations or appointments.

Progress of Work

The Test Codes which have been completed to date are those on

General Instructions
Definitions and Values
Solid Fuels
Stationary Steam Boilers
Reciprocating Steam Engines
Reciprocating Steam-Driven Displacement Pumps
Condensing Apparatus
Displacement Compressors and Blowers
Feedwater Heaters
Refrigerating Systems
Evaporating Apparatus
Steam Locomotives
Internal-Combustion Engines
Hydraulic Power Plants and Their Equipment
Speed-Responsive Governors
Centrifugal and Rotary Pumps

Other Codes being revised or developed for the first time are

Liquid Fuels
Gaseous Fuels
Steam Turbines
Centrifugal and Turbo-Compressors and Blowers
Complete Steam-Power Plants
Water-Cooling Equipment
Gas Producers
Instruments and Apparatus (40 Parts and Chapters)

International Relations on Power Test Codes

The present Committee on Power Test Codes is exchanging preliminary and final drafts of its Codes with the British Institutions of Civil and Mechanical Engineers for the purpose of securing criticism and comment. It is hoped that through such a procedure agreements may be secured between the British and American Codes on the important sections of each. Code work in Great Britain is being carried forward by a joint committee composed of four members each of nine technical societies of England and Scotland.

The World Power Conference held at Wembley, London, in June and July, 1924, was attended by a number of the members of the A.S.M.E. Committee on Power Test Codes and afforded an additional opportunity for Conference. Taking advantage of the presence of these gentlemen in London the Institutions of Civil and Mechanical Engineers arranged for meetings of their joint committees to consider preliminary drafts of the Test Codes for Hydraulic-Power Plants, Boilers and Heat Engines.

Stimulated by the interest shown at the World Power Conference in the development of international test codes for prime movers the International Electrotechnical Commission is laying plans to employ its machinery to bring about as much unity as possible among the recognized prime-mover test codes of the several countries. A standards publication in the series on "Prime Movers for Electrical Plant" entitled "Nomenclature of Hydraulic Turbines" was published by the I.E.C. in July, 1914. Since that time similar material applying to other prime movers has been developed by the several national committees and circulated by the Central Office of the I.E.C.

In America the U. S. National Committee of the I.E.C. has recognized the A.S.M.E. Committee on Power Test Codes as the group best able to prepare American proposals in the form of test codes for prime movers. It accordingly appointed Dr. W. F. Durand and Dr. Fred R. Low its Advisors on Prime Movers.

Following the April, 1926, meeting of the I.E.C. in New York at which the U. S. National Committee was designated as the Secretariat of the I.E.C. Advisory Committee No. 4 on Prime Movers, Dr. Fred R. Low, Chairman of the A.S.M.E. Committee on Power Test Codes, was named Director of the Secretariat. At the September, 1927, meeting of the I.E.C. in Bellagio, Italy, the Advisory Committee on Prime Movers was divided into two committees, Advisory Committee No. 4 on Hydraulic Turbines and Advisory Committee No. 5 on Steam Turbines. The U. S. National Committee, therefore, now holds the Secretariats for both of these committees in addition to the Secretariats for Nomenclature and the Rating of Rivers.

SAFETY

Purpose and Policy

The interest of the members of The American Society of Mechanical Engineers in this subject springs from at least four sources: (*a*) close association with the rapid development of manually operated and automatic machinery, (*b*) growing appreciation of the importance of the science of management to industry and the direct bearing of safety

to health, life and limb on successful operation in industrial plants, (*c*) the realization of the superiority of built-in guards and the dependence of their general adoption on the national safety-code movement, and (*d*) economic considerations which affect in a general way the life and happiness of the various communities of the country. The Society is one of the pioneer organizations at work in this field, feeling a special sense of obligation to have regard for the welfare of human life as an essential part of its engineering achievement.

Brief Historical Note

In the early part of the last decade several of the states began to include in their laws provisions for the protection and care of industrial workers. Since many of these sets of rules or codes involved knowledge of engineering principles and data, A.S.M.E. members were from time to time urged to assist in their development. This situation led naturally to the formation of certain highly technical safety codes by special committees of the Society. The first of these was published in 1915 and is known as a Safety Code for the Use and Care of Abrasive Wheels. The next year (1916) two codes were completed, namely, Code of Safety Standards for Cranes and Code of Safety Standards for Power-Transmission Machinery. In 1917 appeared a Code of Safety Standards for Ladders and a Code of Safety Standards for Woodworking Machinery.

At the 1915 Annual Meeting, Carl M. Hansen, in a paper on Standardization of Safety Principles, pointed out that it is through the standardization of safety codes that engineers can play a most important rôle. Among the important characteristics of safety codes are (*a*) high standards, (*b*) comprehensive scope, (*c*) practical provisions, (*d*) simple rules, and (*e*) positive requirements.

Organization and Procedure

In the spring of 1915 the Committee on Meetings appointed a sub-committee on Protection of Industrial Workers. The members of this committee were John H. Barr, Chairman, Melville W. Mix, John Price Jackson, William A. Viall, and John W. Upp. The purpose of this sub-committee was stated as follows: "To take a part in bringing about the standardization of effective and practical protective devices and methods." A full notice covering its organization and purpose was published in the July, 1915, issue of the Journal of the A.S.M.E. In this article the sub-committee offered to cooperate with all the agencies then engaged in the reduction of industrial accidents.

After serving one year as Chairman, Mr. Barr was compelled to resign by press of other duties and John Price Jackson, then Com-

missioner of Labor and Industry of the Commonwealth of Pennsylvania, was elected in his stead and other members were added to the sub-committee, including a representative of the Bureau of Standards. The Committee on Protection of Industrial Workers was soon made a special committee of the Society and later, in October, 1921, following the publication of the Safety Code for Elevators, one of its greatest contributions to engineering and industrial safety, it was discharged.

By this time the promotion of safety had become a major activity of the Society, so it is now supervised by a Standing Committee which consists of five members, one appointed each year for five years. The personnel of this Committee is given on page 72.

Connection with A.E.S.C.

With the organization and satisfactory functioning of the A.E.S.C., the A.S.M.E. agreed to carry on all of its safety-code work under the procedure of the A.E.S.C., on which body the Society has three representatives. It accordingly now holds joint sponsorship for the sectional committees which are formulating the following safety codes:

Safety Code for Elevators
Safety Code for Mechanical Power-Transmission Apparatus
Safety Code on Machinery for Compressing Air
Safety Code for Conveyors and Conveying Machinery
Safety Code for Mechanical Power Control
Safety Code for Cranes, Derricks and Hoists

At the request of the sponsors for other safety codes the Society is represented on eighteen additional sectional committees, which are listed on page 78.

BOILER CODE

Purpose

To formulate standard specifications for the construction of steam boilers and other pressure vessels and for their care in service.

Brief Historical Note

The Boiler Code Committee was appointed by Col. E. D. Meier, President of the Society in 1911. The first edition, covering power and heating boilers and material specifications, was issued in 1914; it was revised and enlarged in 1918. The 1924 edition contained a new Material Specifications Section and the addition of a new section

devoted to Rules for Inspection. As a result of revisions and addenda to the Code, a revised edition was issued in 1927. The Code for Boilers of Locomotives was issued in 1921, and a new edition in 1926. The Code for Miniature Boilers was first issued in 1922, and two revised editions in 1924 and 1927. In 1923 a revised and enlarged edition of the Low-Pressure Heating Boiler Section of the Code was issued. In 1926, Section VII of the Code on Suggested Rules for the Care of Power Boilers was issued.

Plan of Committee Organization

The Main Boiler Code Committee consists of four representatives of steam-boiler owners and users, two of boiler-insurance companies, one of the railways, two consulting engineers, one representative of industry, three of boiler manufacturers, three of technical schools, one of the technical press, two representatives of steel manufacturers, two of heating-boiler manufacturers, one of the state-inspection authority, one of pressure vessel manufacturers, and two members at large. The personnel of the 1927 Committee is given on page 72.

The Conference Committee consists of thirty-six members who are representatives of the states and cities in which the Boiler Code is operative.

The Main Committee is supplemented by nine sub-committees organized to consider the various phases of boiler-construction problems. (See page 78.)

Committee Procedure

The Committee meets monthly for the purpose of answering inquiries and formulating interpretations on the Boiler Code. Its procedure in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in *Mechanical Engineering*.

National and International Relations

Through cooperation of other organizations, the A.S.M.E. Code has been adopted in 20 states and 15 cities. In addition, the Committee has cooperated directly with various government departments having authority over steam-boiler construction. It has also cooperated with,

and furnished information to, boiler-inspection departments and authorities in many foreign countries. Effort is made through cooperation with the Industrial Machinery Division of the Department of Commerce to keep on file complete records of all foreign boiler codes and regulations.

JOINT ACTIVITIES

(For A.S.M.E. representatives on these and other activities, see pages 79-81.)

American Engineering Council

The Federated American Engineering Societies was organized in December, 1920, and its name changed to American Engineering Council in March, 1924. Its object is " to further the public welfare wherever technical and engineering knowledge and experience are involved, and to consider and act upon matters of common concern to the engineering and allied technical professions."

American Engineering Council coordinates the activities of member national societies, state councils, and local and regional affiliations on national matters and affairs that are of general interest.

The A.S.M.E. has one delegate on the American Engineering Council for every one thousand members. Delegates are elected annually by the membership. The President of the Society is the Chairman of the delegation.

American Engineering Standards Committee

Information relative to the A.E.S.C. may be secured from its Secretary, Dr. P. G. Agnew, 29 West 39th Street, New York, N. Y.

The A.E.S.C. consists of twenty-four member bodies.

Employment Service

Organization

The Four National Engineering Societies — A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. — conduct jointly the Engineering Societies Employment Service.

The Secretaries of these Societies act as the Board of Managers, and the work in each office is in charge of a Business Manager.

There are at present offices in Chicago, New York, and San Francisco. Members should conduct their business with the nearest office.

Bulletin Service

Registration of engineers available for positions is restricted to the membership of the participating organizations.

The Service issues a Bulletin each week which contains lists of positions open and is distributed to members of the four Societies under first-class postage at a subscription rate of $3.00 per quarter or $10.00 per annum, payable in advance.

In addition to the Employment Bulletin there appear regularly in the publications of the respective Societies lists of men and positions available. This is done without charge.

National Service

The policy of the Employment Service will be to open additional offices at strategic points as rapidly as finances will permit, and the local groups of members are willing to undertake responsibility for their management. The Chicago Office is conducted jointly with the Western Society of Engineers, and the San Francisco Office jointly with the Engineers' Club of San Francisco and the California Section of the American Chemical Society.

Contributions for Service

In order to make the Service self-supporting, members securing positions are invited to contribute to the expenses of maintaining the Service on the basis of one and one half per cent of the annual salary contracted for; or three per cent of the amount received for temporary positions.

Correspondence

Correspondence should be addressed to the office nearest to you as follows — *and not to the Society.*

Chicago Office — Engineering Societies Employment Service, 1736 Monadnock Block, 53 West Jackson Boulevard, A. Krauser, Manager.

New York Office — Engineering Societies Employment Service, 33 West 39th Street, Walter V. Brown, Manager.

San Francisco Office — Engineering Societies Employment Service, 714-715 Mechanics Institute Building, 57 Post Street, N. D. Cook, Manager.

Forms for registration will be supplied either to employers or members of the Societies upon request.

Engineering Education

The Society cooperates with educational organizations such as the Society for the Promotion of Engineering Education, on whose Board of Investigation and Coordination it is represented by Past-President

John L. Harrington and Frank A. Scott, member of Council, W. L. Durand, alternate.

Matters pertaining to the education of personnel for the industries is in charge of the Committee on Education and Training for the Industries, which has during the past several years investigated through conferences and correspondence with executives of engineering organizations, particularly with those in charge of personnel work and with educators conducting industrial-education courses, methods which are being used in present practice. From suggestions received from many investigators of education in the industries, a data sheet has been devised and several hundred copies distributed. The data returned are being collated and show the need of further constructive work.

Members of the Society are invited to correspond with the Committee on matters within its scope in standardizing this type of education. The personnel of this Committee is given on page 71.

Engineering Foundation Board

The Engineering Foundation was established in 1914 by Past-President and Honorary Member Ambrose Swasey "for the furtherance of research in science and in engineering, and for the advancement in any other manner of the profession of engineering and the good of mankind."

The Board administers three gifts from Mr. Swasey amounting to about $500,000, the Henry R. Towne Fund of $50,000, and its share of the Edward Dean Adams Fund of $100,000, the income from which is divided equally between the Foundation and the Engineering Societies Library.

John Fritz Medal Board of Award

The John Fritz Medal was established in August, 1902, by the professional associates and friends of the late John Fritz, Past-President and Honorary Member of the A.S.M.E., to perpetuate the memory of his achievement in industrial progress.

The medal is awarded not more than once each year for notable scientific or industrial achievement, with no restrictions on account of sex or nationality. The award is made by a Board of sixteen, four representatives from each of the four national engineering societies.

The recipients of the John Fritz Medal are given in the following list:

The John Fritz Medal Recipients

1902—John Fritz, for scientific and industrial achievement.

1905—Lord Kelvin, for work in cable telegraphy and other general scientific achievements.

1906—George Westinghouse, for the invention and development of the air-brake.

1907—Alexander Graham Bell, for the invention and introduction of the telephone.

1908—Thomas Alva Edison, for the invention of the duplex and quadruplex telegraph; the phonograph; the development of a commercially practical incandescent lamp; the development of a complex system of electric lighting, including dynamos, regulating devices, underground system, protective devices, and meters.

1909—Charles Talbot Porter, for his work in advancing the knowledge of steam engineering and improvements in engine construction.

1910—Alfred Noble, for notable achievements as a civil engineer.

1911—Sir William Henry White, for notable achievements in naval architecture.

1912—Robert Woolson Hunt, for his contributions to the early development of the Bessemer process.

1914—John Edson Sweet, for his achievements in machine design; and for his pioneer work in applying sound engineering principles to the construction and development of the high-speed steam engine.

1915—James Douglas, for notable achievements in mining, metallurgy, education, and industrial welfare.

1916—Elihu Thomson, for achievements in electrical invention, in electrical engineering and industrial development, and in scientific research.

1917—Henry Marion Howe, for his investigations in metallurgy, especially in the metallography of iron and steel.

1918—J. Waldo Smith, for distinguished services in engineering and achievements as an engineer in providing the City of New York with a supply of water.

1919—George W. Goethals, for his work in building the Panama Canal.

1920—Orville Wright, for achievement in the development of the airplane.

1921—Sir Robert A. Hadfield, for the invention of manganese steel.

1922—Charles Prosper Eugene Schneider, for achievement in metallurgy of iron and steel, for development of modern ordnance, and for notable patriotic contribution to the winning of the World War.

1923—Senator Guglielmo Marconi, for the invention of wireless telegraphy.

1924—Ambrose Swasey, for achievement as a designer and manufacturer of instruments and machines of precision, a builder of great telescopes, a benefactor of education, the founder of the Engineering Foundation.

1925—John Frank Stevens, for great achievements as a civil engineer, particularly in planning and organizing for the construction of the Panama Canal; as a builder of railroads, and as administrator of the Chinese Eastern and Siberian Railways.

1926—Elmer Ambrose Sperry, for the development of the gyro compass and application of the gyroscope to the stabilization of ships and airplanes.

1927—John J. Carty, for pioneer achievement in telephone engineering and in the development of scientific research in the telephone art.

Joint Conference Committee

The Presidents and Secretaries of the A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E., constitute the Joint Conference Committee.

The Joint Conference Committee was authorized in January, 1924, by the boards of direction of the four national engineering societies to formulate a permanent workable method of cooperation on public affairs and other matters of common interest, and assisting in cementing the friendship between American and foreign engineers, and to report its recommendations to the several boards.

This Committee considers any matters referred to it that are being undertaken by the organizations, and suggests recommendations as to how they may best be coordinated for the advancement of the profession as a whole. New activities about to be undertaken by a Society are usually referred to it to see if they could well be jointly undertaken and which organizations should undertake them. It also considers projects involving relations with other professions and makes recommendations as to how they should be advanced.

Library

Administration

The Engineering Societies Library is administered by the Library Board, consisting of four representatives and the secretary of each of the four national engineering societies. The library is in charge of a director.

The library of the A.S.M.E. is merged with those of the A.S.C.E., A.I.M.E., and A.I.E.E. into the Engineering Societies Library. (See page 71 for personnel of A.S.M.E. Library Committee.)

Service

The library is open from 9 a. m. to 10 p. m. daily (summer months to 6 p. m.) except Sundays and holidays, for the regular library service.

The Library Service Bureau furnishes technical references, bibliographies, abstracts, copies, translations, etc. Work is done at cost.

The photostat service supplies prints at the cost of 25 cents per sheet.

The loan library loans duplicates and the more recent books to members in any part of the country at the member's risk.

Address all communications to Harrison W. Craver, Director, Engineering Societies Library, 29 West 39th Street, New York.

United Engineering Society

The United Engineering Society was organized on May 11, 1904, when a bill authorizing such a Society was signed by Governor Odell

of New York. It is an incorporated board of twelve trustees, three each from the four national engineering societies. One trustee is appointed each year for a term of three years. The Engineering Societies Building, which is the joint property of the four societies, is administered by the Board of Trustees of The United Engineering Society.

Washington Award

The Society also has representatives on the board of the *Washington Award* of the Western Society of Engineers.

CODE OF ETHICS

History

In 1912, the Society appointed its first Committee on Ethics. This committee produced a code which was adopted by letter-ballot of the Society in 1914.

The 1914 code, which follows, was superseded in 1922 by a shorter code, prepared by a joint committee of the four national engineering societies.

Code of Ethics

Engineering work has become an increasingly important factor in the progress of civilization and in the welfare of the community. The Engineering Profession is held responsible for the planning, construction and operation of such work and is entitled to the position and authority which will enable it to discharge this responsibility and to render effective service to humanity.

That the dignity of their chosen profession may be maintained, it is the duty of all engineers to conduct themselves according to the principles of the following Code of Ethics:

1. The Engineer will carry on his professional work in a spirit of fairness to employees and contractors, fidelity to clients and employers, loyalty to his country, and devotion to high ideals of courtesy and personal honor.

2. He will refrain from associating himself with, or allowing the use of his name by, an enterprise of questionable character.

3. He will advertise only in a dignified manner, being careful to avoid misleading statements.

4. He will regard as confidential any information obtained by him as to the business affairs and technical methods or processes of a client or employer.

5. He will inform a client or employer of any business connections, interests or affiliations, which might influence his judgment or impair the disinterested quality of his services.

6. He will refrain from using any improper or questionable methods of soliciting professional work, and will decline to pay or to accept commissions for securing such work.

7. He will accept compensation, financial or otherwise, for a particular service, from one source only, except with the full knowledge and consent of all interested parties.

8. He will not use unfair means to win professional advancement or to injure the chances of another engineer to secure and hold employment.

9. He will cooperate in upbuilding the Engineering Profession by exchanging general information and experience with his fellow engineers and students of engineering and also by contributing to work of engineering societies, schools of applied science and the technical press.

10. He will interest himself in the public welfare, in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

Professional Conduct Committee

To administer the code, the Council appointed a Standing Committee on Professional Conduct, the personnel of which appears on page 72.

The full procedure is given in the Rules of the Society (R15, Rules 1 and 2).

EXCHANGE OF COURTESIES

A Card of Introduction is issued annually to members of the A.S.M.E. in good standing. Besides serving as a means of general introduction, this also gives entrée to a number of engineering societies and clubs in this country and abroad, with whom an exchange of privileges has been arranged. In the case of an engineering club *these privileges do not include club facilities, sleeping rooms, or restaurant.* In no instance do they entitle members to borrow books from libraries and they are not intended to give residents of cities the privileges of the local engineering organizations. The spirit of the exchange is rather in the nature of special courtesies extended to engineers visiting from other communities, such as the receipt of mail, privileges of the writing and reading rooms, and general information regarding local engineers and industrial plants.

The societies with which the A.S.M.E. has exchange privileges are:

Baltimore, Md., Engineers' Club
Boston, Mass., Society of Civil Engineers
Chicago, Ill., Western Society of Engineers
Cleveland, Ohio, Cleveland Engineering Society
Copenhagen, Danish Society of Civil Engineers
Dayton, Ohio, Engineers' Club of Dayton
Detroit, Mich., Detroit Engineering Society
Gainesville, Fla., Florida Engineering Society
Kansas City, Mo., Engineers' Club of Kansas City
London, Eng., Institution of Civil Engineers
London, Eng., Institution of Mechanical Engineers
London, Eng., Iron & Steel Institute

London, Eng., Junior Institution of Engineers
Los Angeles, Calif., Engineering and Architects Association.
Montreal, Que., Can., Engineering Institute of Canada
Nashville, Tenn., Engineering Association of Nashville
New Orleans, La., Louisiana Engineering Society
New York, American Gas Institute
New York, American Institute of Electrical Engineers
New York, American Institute of Mining & Metallurgical Engineers
New York, American Society of Civil Engineers
New York, American Society of Refrigerating Engineers
New York, American Society of Safety Engineers
New York, Chemists Club Library
New York, Columbia University Library
New York, New York Railroad Club
Oslo, Norway, De Norske Ingeniorforening.
Philadelphia, Pa., Engineers' Club of Philadelphia
Pittsburgh, Pa., Engineers' Society of Western Pennsylvania
Prague, Czecho-Slovakia, Society of Engineers and Architects
Providence, R. I., Providence Engineering Society
Rochester, N. Y., Rochester Engineering Society
St. Louis, Mo., Engineers' Club of St. Louis
Scranton, Pa., Engineers' Society of N. E. Pennsylvania
Scranton, Pa., Scranton Engineers' Club
Seattle, Wash., Pacific Northwest Society of Engineers
Spokane, Wash., Associated Engineers of Spokane
Syracuse, N. Y., Technology Club of Syracuse
Utica, N. Y., Mohawk Valley Engineers' Club

THE WOMAN'S AUXILIARY TO THE A.S.M.E.

The Woman's Auxiliary to the A.S.M.E. was originally organized to further promote the pleasant relationships developed at Annual Meetings.

It has developed, however, into an organization with many varied activities, thus attracting the membership and interest of all.

An Education Fund has been created from which loans have been made to engineering students.

Another activity has been the collection and distribution of technical literature to engineering colleges and societies.

Regular meetings are held on the second Thursday of each month from October to May, inclusive, in the Engineering Societies Building. Dues are $1.00. The initiation fee is $1.00.

All women in the families of members of the A.S.M.E. are most cordially invited to attend all the social functions during the Annual Meeting and to join the Auxiliary.

Council, Committees, and Representatives

ON THE following pages are given the personnel of the Council and the standing and special committees, a complete *list* of the technical committees, and the names of representatives of the Society on joint activities with other organizations. The personnel of Professional Division committees, the names of officers of the Local Sections and Student Branches, and the *membership* of the special technical committees listed on pages 73-78, were printed in the Year Book for 1927.

OFFICERS AND COUNCIL

President

CHARLES M. SCHWAB

Past-Presidents

DEXTER S. KIMBALL
JOHN LYLE HARRINGTON
FRED R. LOW
W. F. DURAND
W. L. ABBOTT

Vice-Presidents

Terms expire December 1927

A. G. CHRISTIE
WM. T. MAGRUDER
ROY V. WRIGHT
H. V. COES

Terms expire December 1928

CHARLES L. NEWCOMB
E. O. EASTWOOD
EDWARDS R. FISH

Managers

Terms expire December 1927

JOHN H. LAWRENCE
EDWARD A. MULLER
PAUL WRIGHT

Terms expire December 1928

ROBT. L. DAUGHERTY
WM. ELMER
CHAS. E. GORTON

Terms expire December 1929

PAUL DOTY
RALPH E. FLANDERS
CONRAD N. LAUER

Treasurer

ERIK OBERG

Secretary

CALVIN W. RICE

Assistant Secretaries

C. E. DAVIES
C. B. LEPAGE
E. HARTFORD

Chairmen of Standing Committees

Representatives on Council but without vote

Finance, H. V. COES
E. H. WEST, *Vice-Chairman*

Meetings and Program, R. M. GATES

Publications, R. E. FLANDERS

Membership, C. E. GORTON

Professional Divisions, ROBT. T. KENT

Local Sections, W. A. HANLEY

Constitution and By-Laws, C. H. BROMLEY

Awards, IRA N. HOLLIS

Relations with Colleges, W. H. KAVANAUGH

Education and Training for the Industries, JOHN T. FAIG

Library, H. A. LARDNER

Research, R. J. S. PIGOTT

Standardization, C. P. BLISS

Power Test Codes, FRED R. LOW

Safety, JOHN PRICE JACKSON

Professional Conduct, E. N. TRUMP

Executive Committee of Council

CHARLES M. SCHWAB, *Chairman*
FRED R. LOW, *Vice-Chairman*
DEXTER S. KIMBALL
W. L. ABBOTT
ROY V. WRIGHT
CONRAD N. LAUER
CALVIN W. RICE, *Secretary*

STANDING COMMITTEES

NOTE.—*Dates in parentheses denote expiration of term.*

Finance

H. V. Coes, *Chairman and Representative on Council* (1929)
E. H. West, *Vice-Chairman* (1928)
Hugo Diemer (1927)
F. A. Schaff (1930)
James L. Walsh (1931)
Council Representatives:
Roy V. Wright (1927)
John H. Lawrence (1927)

Meetings and Program

R. M. Gates, *Chairman and Representative on Council* (1928)
E. Howard Reed (1927)
S. W. Dudley (1929)
W. L. Batt (1930)
G. M. Eaton (1931)

Publications

R. E. Flanders, *Chairman and Representative on Council* (1927)
K. H. Condit (1928)
E. D. Dreyfus (1929)
W. A. Shoudy (1930)
F. V. Larkin (1931)

(*Personnel of Special Committee, p. 73*)

Membership

C. E. Gorton, *Chairman and Representative on Council* (1927)
Hosea Webster (1928)
S. D. Collett (1929)
L. K. Comstock (1930)
F. A. Waldron (1931)

Professional Divisions

R. T. Kent, *Chairman and Representative on Council* (1928)
L. P. Alford (1927)
Archibald Black (1929)
J. W. Roe (1930)
H. W. Brooks (1931)

Local Sections

William A. Hanley, *Chairman and Representative on Council* (1927)
James D. Cunningham (1928)
Paul Doty (1929)
H. Birchard Taylor (1930)
Harry R. Westcott (1931)

Constitution and By-Laws

C. H. Bromley, *Chairman and Representative on Council*
E. E. Howard (1928)
W. D. Ennis (1929)
Geo. E. Pfisterer (1930)
A. D. Blake (1931)

Awards

Ira N. Hollis, *Chairman and Representative on Council* (1930)
R. H. Fernald (1927)
L. P. Alford (1928)
A. M. Greene, Jr. (1929)
H. L. Seward (1931)

Relations with Colleges

W. H. Kavanaugh, *Chairman and Representative on Council* (1927)
E. F. Church (1928)
A. A. Potter (1929)
S. H. Libby (1930)
M. C. Maxwell (1931)

Education and Training for the Industries

John T. Faig, *Chairman and Representative on Council* (1927)
R. L. Sackett (1928)
S. S. Edmands (1929)
W. S. Conant (1930)
D. C. Jackson (1931)

Library

H. A. Lardner, *Chairman and Representative on Council* (1927)
Percy H. Thomas (1928)
O. E. Hovey (1929)
E. B. Katte (1930)
The Secretary

Research

R. J. S. Pigott, *Chairman and Representative on Council* (1928)
D. R. Yarnall (1927)
A. E. White (1929)
Robt. L. Streeter (1930)
W. R. Webster (1931)

(*List of Special Committees, pp. 73-74*)

Standardization

C. P. Bliss, *Chairman and Representative on Council* (1929)
C. F. Hirshfeld (1927)
A. M. Houser (1928)
E. J. Kearney (1930)
L. K. Sillcox (1931)

(*List of Special Committees, pp. 75-77*)

Power Test Codes

Fred R. Low, *Chairman and Representative on Council* (1930)

Terms expire November 30, 1927
H. Cooke
E. R. Fish
O. P. Hood
H. B. Oatley
Wm. F. Uhl

Terms expire November 30, 1928
N. A. Carle
G. A. Goodenough
L. S. Marks
E. N. Trump
A. C. Wood

Terms expire November 30, 1929
C. H. Berry
F. Hodgkinson
D. S. Jacobus
L. F. Moody
E. B. Ricketts

Terms expire November 30, 1930
F. R. Low
L. P. Breckenridge
R. H. Fernald
C. F. Hirshfeld
R. J. S. Pigott

Terms expire November 30, 1931
A. G. Christie
P. Diserens
C. E. Lucke
G. A. Orrok
W. M. White

(*List of Special Committees, p. 77*)

Safety

J. P. Jackson, *Chairman and Representative on Council* (1930)
C. B. Auel (1927) G. E. Sanford (1929)
H. L. Whittemore (1928) L. R. Palmer (1931)

(*List of Special Committees, p. 78*)

Professional Conduct

Edw. N. Trump, *Chairman and Representative on Council* (1927)
Chas. R. Main (1928) Jas. E. Sague (1930)
I. E. Moultrop (1929) Dwight P. Robinson (1931)

SPECIAL COMMITTEES

Boiler Code

Fred R. Low, *Chairman*
John A. Stevens, *Hon. Chairman*
D. S. Jacobus, *Vice-Chairman*
C. W. Obert, *Secretary*
Wm. H. Boehm
Frank S. Clark
Francis W. Dean
Thomas E. Durban
W. F. Durand
Edwards R. Fish
Vincent M. Frost
Chas. E. Gorton
Arthur M. Greene, Jr.
Chas. L. Huston
S. F. Jeter
J. O. Leech
Edward F. Miller
M. F. Moore
I. E. Moultrop
C. O. Myers
James Partington
C. L. Warwick
H. LeRoy Whitney

(*List of Special Committees, p. 78*)

Tellers of Election

Webster Tallmadge W. F. Turnbull
F. M. Van Deventer

Regular Nominating Committee

GROUP	REPRESENTATIVE	ALTERNATE
I	Frank M. Gunby, *Chairman* Boston	Saml. D. Fitzsimmons Providence
II	James Partington New York	H. H. Barnes, Jr. New York
III	V. L. Sanderson Philadelphia	Charles Schenck Bethlehem
IV	E. J. Fermier College Station	Chas. E. Ferris Knoxville
V	Morgan B. Smith, *Secretary* Detroit	John T. Faig Cincinnati
VI	Walter C. Lindemann Milwaukee	Wilson P. Hunt Moline
VII	William Lester Denver	A. LeRoy Taylor Salt Lake City

Local Sections in Nominating Committee Groups

GROUP I

Boston
Bridgeport
Eastern New York
Green Mountain (Vt.)
Hartford
Meriden
New Britain
New Haven
Providence
Waterbury
Western Mass.
Worcester

GROUP II

Metropolitan (N. Y.)
Foreign Members

GROUP III

Baltimore
Buffalo
Central Pa.
Lehigh Valley
Ontario
Philadelphia
Plainfield
Rochester
Syracuse
Utica
Washington, D. C.

GROUP IV

Atlanta
Birmingham
Carolinas
Chattanooga
Florida
Houston
Knoxville
Memphis
New Orleans
Savannah
Virginia

GROUP V

Akron
Cincinnati
Cleveland
Columbus
Dayton
Detroit
Erie
Louisville
Indianapolis
Peninsula
Pittsburgh
Toledo
West Virginia

GROUP VI

Chicago
Kansas City
Mid-Continent
Milwaukee
Nebraska
North Texas
Rock River Val.
St. Louis
Tri-Cities

GROUP VII

Colorado
Inland Empire
Los Angeles
Minneapolis
Oregon
St. Paul
San Francisco
Utah
Western Washington

Biography Advisory Committee

W. F. M. Goss, *Chairman*
Fred R. Low
R. V. Wright
Geo. A. Orrok
John R. Freeman

LIST OF TECHNICAL COMMITTEES

Research

A.S.M.E. Main Research Committee (Standing. For personnel see p. 71)
Special Committee on Lubrication
Special Committee on Fluid Meters
- Sub-Committee on Influence of Installation—Part 2
- Sub-Committee on Description of Flow Meters and Water Meters
- Sub-Committee on Revision of Material on Pitot Tubes in Part 1
- Sub-Committee on Pulsating Flow
- Sub-Committee on High Velocity Measurements
- Sub-Committee on Revision of Part 1—Report on Fluid Meters
- Sub-Committee on Revision of the Dimensional Analysis Section of Fluid Meter Report

Special Committee on Properties of Steam and the Extension of the Steam Table
Special Committee on Strength of Gear Teeth
Special Committee on Cutting of Metals
- Advisory Committee
- Sub-Committee on Cooperation with Industries and Publicity
- Sub-Committee on Standards
- Sub-Committee on Research in Cutting Tools
- Sub-Committee on Properties of Materials
- Sub-Committee on Forming Metals
- Sub-Committee on Cutting Fluids
- Sub-Committee on Turning Processes

Special Committee on Mechanical Springs
- Sub-Committee on Present Status of the Art
- Sub-Committee on Program

Joint Committee on Effect of Temperature on the Properties of Metals
Special Committee on Condenser Tubes
- Executive Committee
- Sub-Committee on Questionnaire
- Sub-Committee on Finance
- Sub-Committee on Bibliography

Joint Committee on Boiler Feedwater Studies
- Executive Committee
- Finance Committee
- Sub-Committee on Sedimentation with and without Chemicals, Pressure and Gravity Filters and Deconcentrators, Continuous Blow-Down Apparatus
- Sub-Committee on Water Softened by Chemicals (External Treatment)
- Sub-Committee on Zeolite Softeners, Internal Treatment, Priming and Foaming, Electrolytic Scale Prevention
- Sub-Committee on Surface Condensers, Evaporators and Deaerators
- Sub-Committee on Corrosion of Boilers and the Effect of Treated Water in Accelerating or Relieving These Troubles
- Sub-Committee on Embrittlement of Metals
- Sub-Committee on Municipal Water Supply in Relation to Boiler Use
- Sub-Committee on Standardization of Water Analysis
- Sub-Committee on Bibliography

Special Committee on Elevators
Special Committee on Boiler Furnace Refractories
Joint Committee on Welding of Pressure Vessels
- Executive Committee
- Sub-Committee on Methods of Test
- Sub-Committee on Procedure of Specifications

Special Committee on Worm Gears
Special Committee on Spark Arresters
Special Committee on Saws and Knives
Special Committee on Existing Supplies of Hardwoods
Special Committee on Cutting Edges (Thin Metal Plates)
Special Committee on Airplane Dynamics
Special Committee on Absorption of Radiant Heat in Boiler Furnaces
Special Committee on Velocity Measurement of Fluid Flow
Special Committee on Strength of Cylindrical Vessels under Pressure
Special Committee on Fuels
Joint Committee on Physical Constants of Refrigerants
Representative on other Research Committees (See p. 80)

Standardization

A.S.M.E. Standardization Committee (Standing. For personnel see p. 71)
Representation on American Engineering Standards Committee (See p. 79)
Special Committee on Symbols and Abbreviations
Sectional Committee on Shafting
- Sub-Committee on Shafting Dimensions
- Sub-Committee on Stock Key Sizes
- Sub-Committee on Standard Formulas for Design of Transmission Shafting
- Sub-Committee on Taper Keys
- Sub-Committee on Woodruff Keys

Sectional Committee on Pipe Threads
Special Committee on Standard Tonnage Basis for Refrigeration
Sectional Committee on Plain Limit Gages for General Engineering
- Sub-Committee on Tolerances, Allowances and Gages for Metal Fits
- Sub-Committee on Methods of Gaging and Specifications for Plain Limit Gages

Sectional Committee on Ball Bearings
Sectional Committee on Elevators
Sectional Committee on Gears
- Executive Committee
- Sub-Committee on Program
- Sub-Committee on Editing Reports
- Sub-Committee on Nomenclature
- Sub-Committee on Tooth Form (Spur Gear)
- Sub-Committee on Helical Gears
- Sub-Committee on Worm Gears
- Sub-Committee on Bevel Gears
- Sub-Committee on Materials
- Sub-Committee on Inspection
- Sub-Committee on Horse Power Rating

Sectional Committee on Standardization and Unification of Screw Threads
- Sub-Committee on Gages and Gaging
- Working Committee

Sectional Committee on Pipe Flanges and Fittings
- Sub-Committee on Cast Iron Flanges and Flanged Fittings
  - Sub-Group on Cast Iron Flanges for Pressures under 100 Lb.
  - Sub-Group on Ammonia Fittings
- Sub-Committee on Screwed Fittings
  - Working Committee
- Sub-Committee on Steel Flanges and Flanged Fittings
  - Working Committee
  - Sub-Group on 1350-Lb. Steel Flanges and Flanged Fittings
  - Sub-Group on Bolting of Flanges
  - Sub-Group on Loose Flanges
- Sub-Committee on Materials and Stresses
- Sub-Committee on Face to Face Dimensions of Flanged Valves

Sectional Committee on Bolt, Nut and Rivet Proportions
- Sub-Committee on Large and Small Rivets
- Sub-Committee on Wrench Head Bolts and Nuts
- Sub-Committee on Slotted Head Proportions
- Sub-Committee on Track Bolts and Nuts
- Sub-Committee on Round Unslotted Head Bolts (Carriage Bolts)
- Sub-Committee on Plow Bolts
- Sub-Committee on Body Dimensions and Material
- Sub-Committee on Nomenclature

Sectional Committee on Scheme for Identification of Piping Systems
- Sub-Committee on Identification by Colors
- Sub-Committee on Classification
- Sub-Committee on Identification Markings Other than Color
- Executive Committee

Sectional Committee on Small Tools and Machine Tool Elements
- Sub-Committee on T-Slots
  - Working Committee
- Sub-Committee on Tool Holders and Tool Post Openings
  - Manufacturers Sub-Group on Lathe and Planer Tools
- Sub-Committee on Machine Tapers
- Sub-Committee on Spindle Noses
- Sub-Committee on Milling Cutters
  - Sub-Group on Profile Cutters
  - Sub-Group on Keyways
  - Sub-Group on Nomenclature
  - Sub-Group on Limits
  - Sub-Group on Formed Cutters
  - Sub-Group on Hobs
  - Sub-Group on Inserted Tooth Cutters
- Sub-Committee on Cut and Ground Thread Taps

Sectional Committee on Screw Threads for Fire Hose Couplings

Sectional Committee on Scientific and Engineering Symbols and Abbreviations
- Sub-Committee on Symbols for Mechanics, Structural Engineering and Testing Materials
- Sub-Committee on Symbols for Hydraulics
  - Sub-Group on Theoretical Hydraulics
  - Sub-Group on Hydrology
  - Sub-Group on Water Power
  - Sub-Group on Pumps and Pumping Machinery
  - Sub-Group on Sanitary Engineering and Water Piping
  - Sub-Group on Irrigation
  - Sub-Group on Turbines
- Sub-Committee on Symbols for Heat and Thermodynamics
- Sub-Committee on Symbols for Photometry and Illumination
- Sub-Committee on Aeronautical Symbols
- Sub-Committee on Mathematical Symbols
- Sub-Committee on Electrotechnical Symbols and Abbreviations, including Radio
  - Sub-Group on Letter Symbols
  - Sub-Group on Electrical Power, including Interior Wiring
  - Sub-Group on Radio
  - Sub-Group on Supply Material
  - Sub-Group on Traction, including Railway Signaling
  - Sub-Group on Telephone and Telegraph
- Sub-Committee on Navigational and Topographical Symbols
- Sub-Committee on Abbreviations for Engineering and Scientific Terms
  - Executive Committee

Sectional Committee on Plain and Lock Washers

Sectional Committee on Machine Pins

Sectional Committee on Code for Pressure Piping
- Sub-Committee on Plan and Scope
- Sub-Committee on Power Piping
- Sub-Committee on Hydraulic Piping
- Sub-Committee on Gas and Air Piping

Sub-Committee on Refrigerating Piping
Sub-Committee on Oil Piping
Sub-Committee on Piping Materials
Sub-Committee on Fabrication Details
Sectional Committee on Standards for Drawings and Drafting Room Practice
Sub-Committee on Specifications for Paper and Cloth
Sub-Committee on Method of Indicating Dimensions
Sub-Committee on Lettering
Sub-Committee on Layout
Sub-Committee on Line Work
Sectional Committee on Standards for Graphic Presentation
Sub-Committee on Plan and Scope
Sub-Committee on Terminology
Sub-Committee on Time Series Charts
Sub-Committee on Non-Time Series Charts
Sub-Committee on Survey of Current Practice
Sub-Committee on Engineering and Scientific Graphs
Sectional Committee on Transmission Chains and Sprockets
Sub-Committee on Roller Chain Standardization
Sub-Committee on Silent Chain Standardization
Sectional Committee on Wire and Sheet Metal Gages
Sectional Committee on Wrought Iron and Wrought Steel Pipe and Tubing
Sectional Committee on Electric Motor Frame Dimensions
Sectional Committee on Plumbing Equipment
Representatives on other Standards Committees (See p. 80)

Power Test Codes

Main Committee on Power Test Codes (Standing. For personnel see p. 71)
Individual Committee No. 1 on General Instructions
Individual Committee No. 2 on Definitions and Values
Individual Committee No. 3 on Fuels
Individual Committee No. 4 on Stationary Steam Boilers
Individual Committee No. 5 on Reciprocating Steam Engines
Individual Committee No. 6 on Steam Turbines
Individual Committee No. 7 on Reciprocating Steam-Driven Displacement Pumps
Individual Committee No. 8 on Centrifugal and Rotary Pumps
Individual Committee No. 9 on Displacement Compressors and Blowers
Individual Committee No. 10 on Centrifugal and Turbo-Compressors and Blowers
Individual Committee No. 11 on Complete Steam Power Plants
Individual Committee No. 12 on Condenser, Water Heating and Cooling Equipment
Individual Committee No. 13 on Refrigerating Systems
Individual Committee No. 14 on Evaporating Apparatus
Individual Committee No. 15 on Steam Locomotives
Individual Committee No. 16 on Gas Producers
Individual Committee No. 17 on Internal-Combustion Engines
Individual Committee No. 18 on Hydraulic Power Plants
Individual Committee No. 19 on Instruments and Apparatus
Individual Committee No. 20 on Speed-Responsive Governors
Representatives on U. S. National Committee of the International Electro-technical Commission (See p. 80)

Safety Codes

A.S.M.E. Safety Committee (Standing. For personnel see p. 72)
Sectional Committee on Safety Code for Mechanical Power Transmission Apparatus
- Sub-Committee for Detail Classification of Belts
- Sub-Committee for Modification of Rule 223 for Cone Pulley Belts

Sectional Committee on Safety Code for Elevators
- Sub-Committee on Research, Interpretations and Recommendations
  - Sub-Group on Program
  - Sub-Group on Arrangements
- Sub-Committee on Operating and Inspecting Rules
- Sub-Committee on Comparison of Existing Rules
- Sub-Committee on Technical Information
  - Executive Committee
  - Working Sub-Committee

Sectional Committee on Safety Code for Machinery for Compressing Air
Sectional Committee on Safety Code for Conveyors and Conveying Machinery
- Sub-Committee on Belt Conveyors, All Types, Steel Included, Apron Conveyors
- Sub-Committee on Chain and Belt Elevators and Conveyors
- Sub-Committee on Gravity Conveyors and Chutes, Live Roll Conveyors
- Sub-Committee on Spiral and Drag or Scraper Conveyors and Cable Flight Conveyors
- Sub-Committee on Cable Conveyors
- Sub-Committee on Air, Steam or Liquid Conveyors

Sectional Committee on Safety Code for Cranes, Derricks and Hoists
- Executive Committee
- Sub-Committee on Overhead and Gantry Cranes
- Sub-Committee on Locomotive and Tractor Cranes
- Sub-Committee on Derricks and Hoists
- Sub-Committee on Miscellaneous Equipment for Cranes and Hoists
- Sub-Committee on Jacks

Sectional Committee on Mechanical Power Control
Representatives on Other Safety Code Committees (See p. 80)

Boiler Code

Main Committee on Boiler Code (For personnel see p. 72)
- Executive Committee
- Sub-Committee on Boilers of Locomotives
- Sub-Committee on Care of Steam Boilers in Service
- Sub-Committee on Heating Boilers
- Sub-Committee on Material Specifications
  - Conferring Committee of the American Society for Testing Materials
  - Conferring Committee of the Association of American Steel Manufacturers
- Sub-Committee on Miniature Boilers
- Sub-Committee on Rules for Inspection
- Sub-Committee on Unfired Pressure Vessels
- Sub-Committee on Welding
- Conference Committee

Résumé

Total number of Committees	247
Total number of A.S.M.E. Members on Committees	546
Total number of Non-Members on Committees	524
Total number of Committee Members	1070

REPRESENTATIVES ON JOINT ACTIVITIES

American Engineering Council

A.S.M.E. Delegates

Terms expire January, 1928

W. L. Abbott, *Chairman, Chicago, Ill.*
John T. Faig, *Cincinnati, Ohio*
A. M. Greene, Jr., *Princeton, N. J.*
John Lyle Harrington, *Kansas City, Mo.*
Ira N. Hollis, *Worcester, Mass.*
S. H. Libby, *Bloomfield, N. J.*
D. S. Kimball, *Ithaca, N. Y.*
William B. Powell, *Buffalo, N. Y.*
H. L. Thompson, *Waterbury, Conn.*

Terms expire January 1, 1929

Charles M. Schwab, *New York.*
O. P. Hood, *Washington, D. C.*
Dean E. Foster, *Tulsa, Okla.*
W. P. Hunt, *Moline, Ill.*
Charles Penrose, *Philadelphia, Pa.*
E. N. Trump, *Syracuse, N. Y.*
T. L. Wilkinson, *Davenport, Ia.*
D. Robert Yarnall, *Philadelphia, Pa.*
Walter S. Finlay, Jr., *New York.*
Ira W. Dye, *Seattle, Wash.*

American Association for the Advancement of Science

Section M, Engineering

Chas. Russ Richards — John T. Faig

Alternates may be appointed each year in the centers at which meetings are held.

American Engineering Standards Committee

A.S.M.E. Representatives

C. M. Chapman[1] (1927) — S. G. Flagg, Jr. (1929)
C. P. Bliss (1928) — K. H. Condit (Alternate)
C. B. LePage (Alternate)

Engineering Foundation Board

A.S.M.E. Representatives

A. M. Greene, Jr. (1928) — W. S. Finlay, Jr.[2] (1929)
Geo. A. Orrok (1930)

Note.—*Dates in parenthesis denote expiration of term*

[1] Represents the A.S.M.E. on the Executive Committee of the A.E.S.C.
[2] A.S.M.E. representative from Board of Trustees of U.E.S.

John Fritz Medal Board of Award

A.S.M.E. Representatives

HENRY B. SARGENT (Oct., 1928) W. F. DURAND (Oct., 1930)
FRED R. LOW (Oct., 1929) D. S. KIMBALL (Oct., 1931)

Joseph A. Holmes Memorial Board

BRIGADIER GENERAL WM. A. BIXBY

National Research Council

Division of Engineering

GEO. A. ORROK (June, 1927) EARLE BUCKINGHAM (June, 1928)
A. G. CHRISTIE (June, 1929)

Society for the Promotion of Engineering Education

Board of Investigation and Coordination

JOHN LYLE HARRINGTON FRANK A. SCOTT
W. L. DURAND (Alternate)

United Engineering Society

A.S.M.E. Representatives

W. L. SAUNDERS (1928) W. S. FINLAY, JR. (1929)
ROY V. WRIGHT (1930)

Western Society of Engineers

Washington Award

JAMES LYMAN (June, 1927) H. V. COES (June, 1928)

General Assignments

By special invitation the Society has representatives on:

National Committee on Metals Utilization, Department of Commerce, STANLEY G. FLAGG, JR., and CHARLES M. MANLY as alternate.

National Conference on Street and Highway Safety, organized by the Department of Commerce, E. J. POSSELT.

National Research Council, Highway Research Committee, H. DE B. PARSONS.

National Screw Thread Commission, LUTHER H. BURLINGAME.

International High Commission, Advisory Committee to the U. S. Section, concerned with a preliminary study and compilation of a report on the use of uniform weights and measures, R. E. FLANDERS.

U. S. Shipping Board, Fuel Conservation Board, H. L. SEWARD.

National Safety Council, American Society of Safety Engineers, Engineering Section, Study of Low Voltage Electrical Hazard, JOHN PRICE JACKSON.

International Electro-technical Commission, W. F. DURAND, F. R. LOW, C. HAROLD BERRY.

Representations on the special committees of the American Welding Society and the American Bureau of Welding:

Fusion Welding for Pressure Vessels, W. F. DURAND, R. L. DAUGHERTY, E. R. FISH, SHERWOOD F. JETER, and D. S. JACOBUS.
Gas Welding Committee of the American Bureau of Welding, JAMES PARTINGTON and C. W. OBERT.
American Bureau of Welding, Advisory Board to the National Research Council, JAMES PARTINGTON.
Structural Steel Welding, Advisory Committee to the American Bureau of Welding, GEO. A. ORROK.
Committee on Standardization Survey, CHARLES M. SCHWAB.

Reports of Meetings

THE following pages present brief reports of the business, general, regional, and national meetings of the Society held during the year 1927. Reference should be made to *Mechanical Engineering* and the *A.S.M.E. News* for more detailed accounts of technical sessions and entertainment features.

The meetings reported are as follows:

Business Meetings:

Semi-Annual, White Sulphur Springs, W. Va., May 23, 1927.
Annual, New York, N. Y., December 7, 1927.

General Meetings:

Semi-Annual, White Sulphur Springs, W. Va., May 23-26, 1927.
Annual, New York, N. Y., December 5-9, 1927.

Regional Meetings:

Kansas City, Mo., April 4-6, 1927.
Seattle, Wash., August 29-31, 1927.

National Meetings:

Aeronautic Division, Buffalo, N. Y., April 25-26, 1927.
National Defense Division, West Point, N. Y., May 12, 1927.
Machine-Shop Practice Division, New Haven, Conn., September 7-9, 1927.
Printing Industries Division, New York, N. Y., September 14, 1927.
Fuels Division, St. Louis, Mo., October 10-13, 1927.
Wood Industries Division, Grand Rapids, Mich., October 17-18, 1927.
Management Division, Rochester, N. Y., October 26-27, 1927.
Iron and Steel Division, Youngstown, Ohio, November 10, 1927.

BUSINESS MEETINGS

Semi-Annual (Spring)

The semi-annual business meeting of the Society was held on May 23, 1927, during the Spring Meeting at White Sulphur Springs, W. Va. The meeting was called to order at 1: 30 p.m. by President Charles M. Schwab, as presiding officer.

One of the most important matters to be brought before the meeting was the new Publication Policy. This was presented and explained in some detail by R. E. Flanders, Chairman of the Committee on Publications. Some discussion followed, but this was in the nature of questions to clarify certain points rather than suggestions for improvements. The general effect seemed to be very pleasing, and when put to a vote the Policy was unanimously approved.

Pittsburgh was announced as the place for the 1928 Spring Meeting.

Secretary Rice, as one of the steps in the procedure for adopting standards, presented by title the following:

Code for the Design of Transmission Shafting

Cast-Iron Pipe Flanges and Flanged Fittings for 125 lb. per sq. in.

Cast-Iron Pipe Flanges and Flanged Fittings for 250 lb. per sq. in.

Malleable-Iron Screwed Fittings for 150 lb. per sq. in.

Cast-Iron Screwed Fittings for 125 and 250 lb. per sq. in.

Annual

The annual business meeting of the Society was held at 2: 00 p.m., December 7, 1927, with Past-President F. R. Low in the chair.

Of great importance to the entire membership is the annual report of the Council and of its standing committees. The year 1927 was an especially active one, and it was with considerable interest that the report as presented by Secretary Rice was received. The report will be found elsewhere in this volume.

In his remarks prior to the presentation of the Junior and Student Awards, Dr. Ira N. Hollis, Chairman of the Committee on Awards, urged that the colleges of this country keep before them the opportunities given them by the generosity of members of the Society. The following awards for 1927 were announced:

Junior Award: Wm. M. Frame, Jun. A.S.M.E., Mechanical Engineer, Westinghouse Electric & Mfg. Co., Sharon, Pa., for his paper

on "Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressures."

Student Awards: (1) Alfred H. Marshall, Princeton University, Princeton, N. J., for his paper on "Evaporative Cooling"; (2) Roger I. Eby, University of Washington, Seattle, Wash., for his paper on "Measurement of the Angular Velocity of Flywheels."

James D. Cunningham, acting on behalf of the Local Sections Delegates Conference, announced the Nominating Committee for 1928, as follows:

GROUP I — Fred H. Daniels, Worcester, Mass.; Charles R. Main, Boston, Mass., *Alternate.*

GROUP II — James Partington, New York, N. Y.; Howel H. Barnes, Jr., New York, N. Y., *Alternate.*

GROUP III — Charles Schenck, Bethlehem, Pa.; Donald B. Prentice, Easton, Pa., *Alternate.*

GROUP IV — Harry L. Freeman, Birmingham, Ala.; Robert Gregg, Atlanta, Ga., *Alternate.*

GROUP V — John T. Faig, Cincinnati, Ohio; J. Roland Brown, Cleveland, Ohio, *Alternate.*

GROUP VI — Wilson P. Hunt, Moline, Ill.; Dean E. Foster, Tulsa, Okla., *Alternate.*

GROUP VII — H. L. Doolittle, Los Angeles, Cal.; Wayne A. S. Harmon, Los Angeles, Cal., *Alternate.*

Other business consisted of the reading by title of the Safety Code for Mechanical Power-Transmission Apparatus, and Standards for Cast-Iron Long-Turn Sprinkler Fittings (Screwed and Flanged).

GENERAL MEETINGS

Semi-Annual (Spring) Meeting

White Sulphur Springs, W. Va.—May 23-26, 1927

The White Sulphur Springs meeting was the first general meeting of the Society to be held at a resort since the Atlantic City meeting in 1910. Any members who were apprehensive of the practicality of a meeting in a non-industrial center must have been reassured by the success of this one. The attendance, drawn entirely from outside the immediate district of meeting, was very good, and representative of every state east of the Mississippi, as well as many of the western states. The program was arranged to allow about equal amounts of time for technical sessions and entertainment features, and both were equally well supported. The Greenbrier Hotel was headquarters for the meeting and provided adequate accommodations and facilities for all events.

Paralleling the meeting, the Fourteenth Western Meeting of the American Society of Refrigerating Engineers was also held at the

Greenbrier. Its technical sesssions were held at such times that they did not conflict with the A.S.M.E. technical program, so that those who so desired were able to attend the technical sessions of both societies. As many members of the A.S.R.E. are also members of the A.S.M.E. this arrangement was very satisfactory.

Council Meeting

The Meeting formally opened on Monday morning, May 23, 1927, at 9: 30, with the meeting of the Council. President Schwab presided at this as well as at a second afternoon session.

The morning session was devoted almost entirely to discussion of the budget for 1927–1928, the single exception being the matter of the next Spring Meeting, which, upon the joint recommendation of the Meetings and Program Committee and the Local Sections Committee, was voted to be held in Pittsburgh, Pa., during April or May, 1928.

The afternoon session convened at 2: 30, with the 1927–1928 budget again the subject of discussion. After the Special Committee had made its report and those present had been made cognizant of the various needs to be met, approval was voted.

Mrs. Roy V. Wright reported for the Woman's Auxiliary as its Chairman. The members present voiced general approval and appreciation of the splendid work done by this organization.

Other business transacted included approval of the new Publication Policy and of a new Professional Division on Iron and Steel, the report of the Executive Committee, and Presidential Appointments. A number of the Standing Committees of Council also reported at this session, those represented being the Meetings and Program Committee, the Publications Committee, the Membership Committee, the Committee on Professional Divisions, the Local Sections Committee, the Committee on Awards, the Power Test Codes Committee, the Committee on Education and Training for the Industries, and the Standardization Committee.

Business Meeting

The semi-annual business meeting, which was held on Monday afternoon, is reported on page 83.

Entertainment Events

White Sulphur Springs being far from an industrial center, there were of course no inspection trips. The Entertainment Committee, therefore, had to be exceptionally active to provide sufficient entertainment to fill these gaps.

The initial event was the combined bridge and dance of Monday evening. Mr. Schwab, in an informal and unscheduled talk immediately following dinner, commended the Woman's Auxiliary for the work they were doing and particularly for their assistance in the entertainment programs of the meetings of the Society.

Tuseday afternoon marked the beginning of a most interesting and hotly contested golf tournament for the men. The ladies enjoyed a motor tour through the hills surrounding the hotel, while both ladies and gentlemen managed to devote some time to horseback riding, tennis, archery, and swimming.

Banquet and Carnival

The banquet, which was held jointly with the American Society of Refrigerating Engineers, occupied the major portion of Tuesday evening. President Schwab acted as toastmaster in his usual good-natured and altogether pleasing manner. He extended the welcome of the Society to the A.S.R.E., and introduced the president of that society, W. H. Carrier, who addressed the assemblage briefly.

One of the most important features of the evening was the presentation of the A.S.M.E. Medal to Wilfred Lewis for his very valuable work on gear teeth. Mr. Lewis was presented to the President by Conrad N. Lauer, Manager of the Society. His remarks as well as those by Mr. Schwab and Mr. Lewis in presenting and accepting the medal were published in the July, 1927, issue of *Mechanical Engineering*.

The chief speaker of the evening, Mr. Loughnan Pendred, editor of the well-known British publication, *The Engineer*, proved a most interesting addition to our list of pleasantly remembered after-dinner speakers. Mr. Pendred presented to the Society engrossed greetings from the Institution of Mechanical Engineers, of whose Council he is a member, as follows:

"To The American Society of Mechanical Engineers, assembled at White Sulphur Springs on May 24, 1927, the Institution sends greetings and heartily desires that the cordial relationship which has heretofore existed between the two societies may ever be maintained. The Institution is confident that the union of the English-speaking engineers of all countries will promote industry and increase the happiness, contentment, and welfare of mankind."

President Schwab replied as follows:

"Mr. Pendred, on behalf of The American Society of Mechanical Engineers, we accept this testimonial from your English Society and express to you our warmest appreciation of the sentiments so kindly expressed. Will you convey to them for us that appreciation and that heartfelt sincerity with which we express it? It has been a pleasure to

have had you among us, and it is but a step forward in the cementing of the happy relations between our two great countries that must bear fruit in the future."

Following the dinner a water carnival in the swimming pool and dancing in the ball room occupied the attention of the guests for the remainder of the evening.

Wednesday's entertainment was made up of golf, marking the close of the tournament, a novelty golf game, a putting contest for the ladies, archery, swimming, etc. Prizes for the winners of the various contests and tournaments were awarded during the dinner hour. Bridge and dancing again filled the evening.

Technical Committee Meetings and Conferences

Available time during the first three days of the meeting was made good use of by a number of Technical Committees in holding meetings.

Research Meetings

Main Research Committee. On Monday evening the Main Research Committee met for dinner at 7: 00 o'clock, and continued in session through the remainder of the evening. The entire committee membership was in attendance.

The appropriation by the Council of $14,000 for Research for the coming fiscal year, October, 1927–1928, was reported. The Main Committee was greatly encouraged in its development of a new and enlarged research program for the Society by the interest and support of President Schwab. It was planned among other things to present this program for discussion at the Open Session on Research to be held at the time of the December, 1927, Annual Meeting.

In line with its policy of stimulating and correlating both its own and other research work in mechanical engineering throughout the country, ways and means of giving these activities greater publicity were discussed. Several new suggestions were made and adopted.

After consideration of certain matters requiring formal action, the meeting was adjourned, review of Special Committees' progress being referred to the Chairman and Secretary for report.

A.S.M.E. — A.S.R.E. Conference. Following the recommendations of their respective Councils, representatives of The American Society of Mechanical Engineers and the American Society of Refrigerating Engineers met on Tuesday at 1: 00 p.m. at a joint luncheon conference, to consider the advisability of undertaking a joint research on the physical constants of several refrigerants. Messrs. H. Harrison, F. G. Hechler, G. A. Horne, and C. C. Spreen, representing the two societies, and Messrs. C. B. LePage and C. G. Worthington, of the

A.S.M.E. Staff, were present. Research work along the above-mentioned lines was being conducted by the Bureau of Standards for the A.S.R.E., but it was felt that joint sponsorship with the A.S.M.E. would make possible a far more comprehensive investigation. It was the opinion of the conference that a joint research committee should be formed to organize and direct the investigation as proposed, and it was decided that recommendations to this effect should be made to the Main Research Committees of the two societies.

Fluid Meters Committee. The Special Research Committee on Fluid Meters met at 11: 00 o'clock on Tuesday morning.

Progress of the Sub-Committees working on Parts 1, 2, and 3 of the Fluid Meter Report were reviewed at length. J. M. Spitzglass announced his proposed trip to Germany, where he expected to have an opportunity to do considerable experimental work for the Fluid Meters Committee. The scope of this work was discussed in detail, including the possibilities of cooperation with similar researches going on abroad.

Mechanical Springs Committee. The Special Research Committee on Mechanical Springs met at luncheon on Wednesday and continued in session well into the afternoon. The Executive Committee had met the previous day in Washington, D. C.

Encouraging response to the financial campaign being carried on by the Committee was reported. Beginning about July 1, 1927, a research worker was to be employed full time on the amplification of the Code of Design proposed at the A.S.M.E. Spring Meeting in 1925 by J. K. Wood.

It was reported that certain revisions attending the make-up of the Bibliography on Mechanical Springs had delayed its publication.

Standardization Meetings

Milling Cutters. On Tuesday morning the Committee on the Standardization of Milling Cutters held a three-hour session.

The Committee first discussed the reports presented by Chairman T. R. Jones of the Sub-Group on Profile Cutters. This report covered proposed standards on Metal Slitting Cutters; Screw-Slotting Cutters; Plain Milling Cutters, Slide Milling Cutters, Angular Cutters; Two-Lipped Slotting End Mills.

The report presented by Mr. Jones was verbal and in some detail, since his Sub-Group had held a seven-hour session the previous day during which much of the material previously issued to the Committee in mimeographed form had been somewhat modified and the number of cutters of the various types considerably reduced.

Mr. Jones also reported that the proposed standard on Shell End Mills and Cutter Clamping Screw had been set in page-proof form

and had been distributed to the technical press, interested firms, and individuals for criticism and comment.

Erik Oberg, a member of Sub-Group No. 3 on Nomenclature, reported for this Sub-Group and led a detailed discussion on the report which had been mailed in mimeographed form to all the members of the Committee. Some modifications were also recommended and the Secretary was authorized to proceed with the setting of this report in type for further distribution to interested bodies for criticism and comment.

Machine Tapers. The Committee on the Standardization of Machine Tapers held a meeting on Tuesday afternoon. First on the order of business was the election of a permanent Chairman. Ernest F. DuBrul, general manager, National Machine Tool Builders' Association, who had served as Temporary Chairman, was elected. The Committee then voted to recommend to the sponsor organizations the appointment of additional engineers to round out the representation on the Committee, special attention to be given to the "User Group."

The Committee discussed in a virile way the present practice relative to the manufacture and use of machine tapers commonly known as the Brown and Sharpe Taper, Morse Taper, and Jarno Taper. It was greatly helped in this by papers which had been previously prepared under the direction of F. O. Hoagland, master mechanic, Pratt and Whitney Company, a member of the Committee. These papers included Mr. Hoagland's recommendations for a modification of the Morse Taper.

There was a strong sentiment in the Committee for the recommendation of a new taper to be known as the "American Machine Taper." It was proposed that this taper be $\frac{3}{4}$ inch to the foot or 1: 16. The Committee voted to prepare and send out a questionnaire to test the sentiment among the users of machine tapers. They proposed to ascertain whether it is generally believed (1) if one standard taper is favored, (2) if the $\frac{3}{4}$-inch-to-the-foot taper would meet with general approval, (3) if the $\frac{6}{10}$-inch-to-the-foot taper would be preferable, (4) if two standards are thought to be necessary, and (5) if so, which two would be preferred. This questionnaire was to be accompanied by a historical statement covering the development and use of the present tapers and technical arguments for the new taper of $\frac{3}{4}$ inch to the foot.

Technical Sessions

With the exception of the first day, all sessions were held in the morning, the remainder of the day being devoted to sports and other forms of recreation. This plan worked out admirably, if one may

judge by the numbers present at the sessions and the enthusiasm with which the discussion progressed. There was a delightful informality throughout which proved most profitable to those in attendance. Eleven sessions were held during the four days of the meeting, as follows: Education and Training for the Industries; Central-Station Power; Fuels; Management; Wood Industries; Hydraulics; Machine-Shop Practice; Oil and Gas Power; Railroad; Industrial Power; and Materials Handling.

The titles and authors of the papers presented at the various sessions follow:

Monday Afternoon, May 23

Session on Education and Training for the Industries

(Under auspices of Committee on Education and Training for the Industries)

The General Motors Institute of Technology, ALBERT SOBEY.
A Description of the Henry Ford Trade School, FREDERICK E. SEARLE.
A Uniform Apprenticeship Certificate for Cooperating Groups of Employers, WM. S. CONANT.

Session on Central Station Power

(Under auspices of Power Division)

High-Pressure Steam at Edgar Station, I. E. MOULTROP and E. W. NORRIS.
High Steam Pressure and Temperatures at Crawford Avenue Station, ALEX D. BAILEY.
The Strength of Pipe Flanges, EVERETT O. WATERS.

Tuesday Morning, May 24

Fuels Session

(Under auspices of Fuels Division)

Economics of Coal Carbonization in the United States, GEO. A. ORROK.

Management Session

(Under auspices of Management Division)

Accidents and Production, L. W. WALLACE.

Wood Industries Session

(Under joint auspices of Wood Industries and Materials Handling Divisions)

Material Handling between Stump and Board, LANDON C. BELL.
The Design of Motor-Bus Bodies, L. C. JOSEPHS, JR.

Wednesday Morning, May 25

Hydraulic Session

(Under auspices of Hydraulic Division)

Rack Structure and Headgates of Cedar Creek Hydroelectric Station, W. S. Lee.

Specific Characteristics for Hydraulic Turbines, Arnold Pfau.

Comparison and Limitations of Various Water-Hammer Theories, Ray S. Quick.

Progress Report of Hydraulic Division, presented by Lewis F. Moody.

Machine-Shop Practice Session

(Under auspices of Machine-Shop Practice Division)

Hysteresis Relative to the Operation of Mechanical Springs, Jos. K. Wood.

Arc Welding, J. F. Lincoln.

Vibration of Frames of Electrical Machines, J. P. Den Hartog (*Read by title*).

Oil and Gas Power Session

(Under auspices of Oil and Gas Power Division)

The Study of Oil Sprays for Fuel-Injection Engines by Means of High-Speed Motion Pictures, Edward G. Beardsley.

Experimental Combustion Chambers Designed for High-Speed Diesel Engines, Carlton Kemper.

Some Uses of the High-Speed Multi-Cylinder Indicator, H. M. Jacklin.

The Range and Severity of Torsional Vibration in Diesel Engines, Frederic P. Porter (*Read by title*).

Thursday Morning, May 26

Railroad Session

(Under auspices of Railroad Division)

High Steam Pressures in Locomotive Cylinders, Lawford H. Fry.

Diesel Traction for Railroads, William Arthur.

Industrial Power Session

(Under auspices of Power Division)

Management of Industrial Power, Plant Engineer's Viewpoint, Henry F. Scott.

Management of Industrial Power, Manager's Viewpoint, W. N. Polakov.

Evaporators for Boiler Feed Make-up Water, W. L. Badger.

Materials Handling Session

(Under auspices of Materials Handling Division)

The Relation of Building Design to the Manufacturing Process, Charles P. Wood.

Annual Meeting

New York, N. Y.—December 5-9, 1927

The Forty-Eighth Annual Meeting of the Society was held in New York, N. Y., December 5 through 9, 1927. Attendance is not necessarily a measure of the success of a meeting, but the fact that 2351 appeared at the registration headquarters, thus establishing a new attendance mark, is a source of gratification to those who had the meeting in charge.

Parallel Events

Several other happenings in New York during the meeting contributed much to its success. The Power Show at the Grand Central Palace attracted a large number of engineers and industrial executives. This comprehensive mechanical exhibition, in its sixth year, is growing in influence in the development of mechanical-engineering devices. An unusually large display of safety appliances was part of the exposition.

The American Society of Refrigerating Engineers held its 23rd annual meeting at the Hotel Astor, December 5 through 7. The Power Transmission Association held a luncheon meeting at the Hotel Commodore on December 7, and the Taylor Society held its annual meeting, December 7 through 10.

A joint session was held with the A.S.R.E. on December 6, and all members of the Society interested in mechanical power transmission were invited to attend the luncheon meeting at the Commodore on December 7. Other joint sessions held were those of the Machine-Shop Practice Division with the Machine Tool Congress on December 6 and 7; the Management Division with the American Management Association on December 8; and the session on Photography with the Optical Society of America on December 7.

Council Meeting

Two meetings of the Council were held during the Annual Meeting. On Monday, December 8, with President Schwab presiding, a large amount of business was dispatched.

On Friday, December 9, the new president, Alex Dow, received from Mr. Schwab a silver mounted ebony gavel, his symbol of office, and the new officers and members of the Council for the year were introduced. Erik Oberg was reappointed treasurer of the Society for the coming year, and Calvin W. Rice was reappointed Secretary. The following Executive Committee was chosen: Alex Dow, chairman, Charles M. Schwab, Fred R. Low, Edwards R. Fish, vice-chairmen, John H. Lawrence, Conrad N. Lauer, Luther B. McMillan, and Calvin W. Rice, secretary.

At the request of the New England Council, H. R. Westcott, chairman of the organization committee for a survey of the manufacturing equipment now used by New England industries, presented a report and asked approval of Council in this undertaking. Members of the New England Council were much impressed with the offer of the New England membership of the Society to place its facilities and organization at their command, as expressed at the machine-shop meeting of the Society at New Haven last September.

It was voted that a representative of the American Engineering Council be immediately requested to appear before the House Appropriations Committee in Washington, together with the representative of the Department of Commerce, as representing The American Society of Mechanical Engineers, and support the recommendations and request for an appropriation for this survey.

Business Meeting

The annual business meeting, which was held on Wednesday afternoon, December 7, is reported on page 83.

Social Events

Presidents' Night and Melville Award

President Schwab presented his presidential address as part of the Presidents' Night program, Tuesday evening, December 6. The address, which was entitled "Human Engineering," will be found elsewhere in this volume.

Following President Schwab's address, Dr. Fred R. Low, Past-President, introduced Leon P. Alford as the first Melville medalist. The Melville Medal is derived from the income of a bequest of Rear-Admiral George W. Melville, a past-president and honorary member of the Society. According to his directions it will be awarded annually to such competing member of the Society as shall present to the Society for discussion and publication the best original paper or thesis on any mechanical subject.

Mr. Alford's paper on "Laws of Manufacturing Management," which treated of the contribution of engineers to the science of management, was read at the Annual Meeting in 1926. Mr. Schwab presented the medal to Mr. Alford, whom he cited as particularly worthy, not only on account of his paper, but because of his staunch friendship and service to the Society.

Secretary Rice presented the report of the Tellers of Election, giving the results of the letter ballot for officers of the Society. The following were declared elected:

President: Alex Dow.
Vice-Presidents: John H. Lawrence, E. A. Muller, Newell Sanders.

Managers: PAUL WRIGHT, F. H. DORNER, WM. A. HANLEY, L. B. MCMILLAN.

Delegates to the American Engineering Council: L. B. ALFORD, DAVID W. BRUNTON, HAROLD V. COES, ALEX DOW, ARTHUR M. GREENE, JR., JOHN LYLE HARRINGTON, DEXTER S. KIMBALL, WM. S. LEE, R. C. MARSHALL, JR.

Dr. William F. Durand, Past-President of the Society, then led Mr. Dow to the stage and introduced him to President Schwab, who in turn introduced him to the Society.

The annual reception by the Society to the President, President-Elect, Medalist, ladies, members, and guests, was held on the Fifth Floor, and was followed by dancing.

THE ANNUAL DINNER

More than 850 members and guests attended the Annual Dinner at the Hotel Astor, Wednesday evening. R. E. Flanders, Manager of the Society, served as toastmaster, and was assisted by Mr. Schwab as "master of overtones." Mr. Schwab introduced the distinguished guests present, paying special tribute to Worcester R. Warner who celebrated his thirteenth year as an A.S.M.E. past-president, and delivered his own valedictory as President of the Society.

Calvin W. Rice, Secretary of the Society, then called the roll of members who had joined during the year. William L. Abbott, Junior Past-President, delivered the charge to the new members.

Alex Dow, President-Elect, gave a brief talk regarding his relationship to the Society.

The principal address of the evening was made by Dr. H. E. Howe, editor of *Industrial and Engineering Chemistry,* chairman of the executive board of the National Research Council, and representative of the American Institute of Chemical Engineers on the American Engineering Council, which he serves as treasurer. Dr. Howe gave a fascinating account of the recent results in chemical research, illustrating his remarks with samples of the resulting products. His address, entitled "The New Competition," was published in the April, 1928, issue of *Mechanical Engineering.*

The formal program closed with the announcement by Secretary Rice of the international engineering congress in Japan in September of 1929. Elmer A. Sperry, Chairman of the American Committee of Participation, was present and was introduced to the audience. Rising again later, Mr. Sperry pointed out that Secretary Hoover is Honorary Chairman of the American Committee and in that capacity has taken a tremendous interest in organizing the plans and in securing country-wide support for the congress. Mr. Sperry expressed the hope that every American engineer could visit Japan and see the splendid work of Japanese engineers, who have used simple, straightforward methods not hampered by precedent or tradition.

Other Social Events

The Open House on Monday evening, conducted by the Philadelphia Section, gave a large amount of enjoyment to the 400 who were present. Simultaneously, the Woman's Auxiliary conducted a similar affair for the ladies on the eleventh floor of the Engineering Societies Building, where pleasant entertainment and refreshments were provided.

The Fourth Annual Luncheon and Annual Meeting of the Woman's Auxiliary was held Tuesday afternoon at the Fraternity Clubs Building. Dean Virginia Gildersleeve of Barnard College spoke.

On Wednesday, the Annual Ladies' Tea, Reception, and Dance was held at the Hotel Astor.

Lectures

W. E. Wickenden, Director of Investigation, of the Society for the Promotion of Engineering Education, New York, delivered a lecture, Tuesday afternoon, on "What the National Societies Can Do for Engineering Education." He touched on questions of outstanding importance and interest to the profession, and presented the results of a questionnaire sent out to 2000 leaders in the field. The lecture appeared in full in the February, 1928, issue of *Mechanical Engineering*.

The third Henry Robinson Towne lecture was delivered by Prof. T. S. Adams, Professor of Political Economy at Yale University and President of the American Economic Association, who spoke on "The Relation between Industry and Taxation." He explained briefly the difference of opinion with regard to tax reduction between President Coolidge and Secretary Mellon on the one hand and the United States Chamber of Commerce on the other, and gave his views of the problem as a student of taxation. He touched upon the income tax and on the duty, as he saw it, of the business man toward tax reform. This lecture appeared in the February, 1928, issue of *Mechanical Engineering*.

Technical Committee Meetings and Conferences

Research Committee Meetings

A large group of the Society's research committees carried out an active program of technical sessions and committee meetings during the Annual Meeting.

The dinner meeting of the Main Research Committee on Monday evening was of particular interest as it brought together for the first time the chairmen and secretaries of the various Special and Joint Research Committees, representatives of the research Survey Committees of the Professional Divisions, and certain other interested

persons. In organizing this meeting the Committee had for its purpose the creation of a better understanding of A.S.M.E. research methods and their future possibilities through an informal discussion among those particularly concerned with the development and conduct of these affairs. With the rapid growth (during the past few years) of research consciousness in industry, there has come a similar growth in A.S.M.E. research activities, and this meeting provided an opportunity for the exchange of many helpful ideas relative to the conduct of cooperative research projects in industry.

On Wednesday the Special Research Committee on Steam Tables conducted its annual open session on the progress of its studies into the extension and accurate checking of the existing steam tables. Similar sessions were carried on the following day by the research committees on Boiler Feedwater Studies and Lubrication. All these meetings attracted considerable interest the attendance averaging about 100 persons in each case.

In addition to these general sessions some dozen research committees and their several sub-committees met and discussed their programs. The attendance at these meetings totaled approximately 150 men.

Standards, Power Test Codes, Etc.

Committees dealing with standards and safety codes held valuable meetings during the week.

At the meeting of the Committee on Power Test Codes, a preliminary draft of the test code for complete standard electric power plants was presented, and the final revision of the Test Code for Gas Producers was promised early in 1928.

The National Screw-Thread Commission and the American Gage Design Committee met during the meeting, the latter completing standard dimensions for cylindrical and thread-plug gages from ¼ in. to 1¼ in. in diameter.

Professional Divisions

The activities of the Professional Divisions in 1927 brought many developments which furnished topics for discussion at the conference held on December 5. George E. Hagemann described the cooperation of such divisions as Materials Handling and Management with other divisions. M. B. Richardson spoke of the need of the Divisions' doing professional service work such as that accomplished by the Railroad Division in its survey of the possibilities for mechanical engineers in that industry.

The securing of papers for the Division sessions and meetings is one of the important and pressing problems and this was discussed by M. B. Richardson, George Hagemann, H. B. Oatley, and V. J. Azbe, who suggested various methods such as the development of a Divisions' " who's who," the use of industries, and using the Society's company file.

Cooperation with other organizations was discussed by Charles Lytle, who outlined the arrangement existing between the Management Division and the American Management Association; W. C. Glass, who spoke of the cooperation of the Printing Machinery Division and the Graphic Arts organizations; Walter Samans and Dean Foster, who told of the movement now under way of the American Petroleum Institute to form a technical section with possible control of technical activities in the petroleum field, and suggested that the Petroleum Division might arrange some form of cooperation.

During the discussion by the Local Sections delegates of the question, How can the Local Sections be more helpful to the Professional Divisions? representatives of the Divisions were present. One valuable point brought out at this time was that the Local Sections could aid the Divisions by making comments in the reports of their meetings as to the newness and value of the material presented, the ability of the speaker to present his subject and hold the interest of his audience, and noting, when it seemed advisable, whether the paper seemed sufficiently valuable to be presented at some other meeting of the Society.

Over fifty attended the dinner party held Monday evening, December 5, when the members of the Council were the guests of the Professional Divisions. Robert L. Kent was toastmaster and introduced Dean Kimball, who, representing Mr. Schwab, gave a splendid talk on the value of the Divisions to the Society.

President-Elect Dow expressed a keen desire to become thoroughly acquainted with the work of the Divisions, and called their work the foundation upon which the Society rested.

William Abbott and Fred Low, past-presidents of the Society, were also guests and each extended a characteristic word of greeting.

Local Sections Delegates Conference

All but two of the Local Sections of the Society were represented at the conference which started on Monday and continued through the next day. William A. Hanley, chairman of the Local Sections Committee, presided and conducted the discussion of suggestions made at an informal conference of Sections representatives at the Spring Meeting at White Sulphur Springs. These suggestions included

topics for meetings, cooperation with Professional Divisions and Student Branches, standards of membership, increasing the influence of the Society publications, and the encouragement of the Society to participate more fully in public affairs.

At the luncheon on Monday at the Hotel Astor, delegates gathered with members of the Council and chairmen of its standing committees to hear a few words from President Schwab and President-Elect Dow. Tuesday morning the seven geographical groups met separately to select the Nominating Committee and to develop plans for Regional Spring Meetings and National Meetings of the various Professional Divisions. On Tuesday afternoon the Conference prepared resolutions to the Council on the items discussed during the meetings.

A special greeting was extended to the representative of the new section at York, Pa., which was authorized by the Council at its meeting on Monday morning.

Student Branch Conference

Following a luncheon at the Fraternity Club on Wednesday, which was addressed by President-Elect Alex Dow, the representatives of some thirty student branches met to discuss problems of common interest. W. H. Cavanaugh, chairman of the Committee on Relations with Colleges, presided. The students themselves presented and discussed important questions having to do with student-branch operation.

Excursions

Many members took advantage of the unusual opportunity which the excursions afforded them to visit industrial plants which illustrated new developments in the field of engineering and which in many cases served to illustrate graphically points brought out in the papers and discussions at the technical sessions.

Four excursions were conducted during the meeting. On Tuesday the party visited the new pulverized-fuel plant of the New York Steam Company at Kip's Bay, and the new East River Station of the New York Edison Company. On Wednesday the Greenpoint Works of the Brooklyn Union Gas Co. and the Hudson Avenue Station of the Brooklyn Edison Co. were visited. On Thursday there was a round-trip bus ride to Jersey City through the Holland Tunnel.

Technical Sessions

The Technical Sessions at the 1927 Annual Meeting were so planned that only two papers or one symposium would be presented at any one session, in order that there might be ample time for their discussion.

The complete papers, with the written and oral discussions and the closures of the authors, will appear in the new quarterly sections of Transactions during 1928.

The following summary of the technical program gives the titles and authors of the papers presented at the various sessions:

Tuesday Morning, December 6

Machine-Shop Practice Session (I)

Symposium on Hydraulic Feeds for Machine Tools

(Under auspices of Machine-Shop Practice Division and Machine-Tool Congress)

Characteristics of Hydraulic Feed and Drive for Cutting Tools, WALTER FERRIS.

Hydraulics and Modern Machine-Tool Design, WALDO J. GUILD.

The Development of Hydraulic Feeds on Multiple Drilling Machines, R. M. GALLOWAY.

Hydraulic Feeding Mechanism for Milling Machines, S. EINSTEIN.

Session on Industrial Power

(Under auspices of Power Division)

The Ruths Steam Accumulator, R. A. LANGWORTHY.

Stresses and Reactions in Expansion Pipe Bends, A. M. WAHL.

Railroad Session (I)

(Under auspices of Railroad Division)

Progress in Railroad Mechanical Engineering, A Report of the Railroad Division, presented by H. B. OATLEY.

Can Accident Prevention Be Reduced to a Science? THOMAS H. CARROW (*Read by title*).

Back Pressure and Cut-off Adjustment for the Locomotive, THOMAS C. MCBRIDE.

The Motor Truck and L. C. L. Freight, F. J. SCARR.

General Session (I)

The Steel-Wool Industry, CROSBY FIELD.

The Modern Fire Engine, KARL W. STINSON.

Tuesday Afternoon, December 6

Machine-Shop Practice Session (II)

Symposium on Plant and Equipment Maintenance

(Under auspices of Machine-Shop Practice Division and Machine-Tool Congress)

Maintenance of Machine Equipment at the National Cash Register Company's Plant, WM. HARTMAN.

Plant Maintenance and Return on Capital Investment, W. H. CHAPMAN.

Maintenance of Shop Equipment, J. R. WEAVER.

Maintenance of Shop Equipment, C. S. GOTWALS.

Plant Maintenance, GEO. H. ASHMAN.

124561

Joint Session with A.S.R.E.

General Heat-Transfer Formulas, E. R. Cox (*Contributed by A.S.M.E.*).
How Shall Heat Transmission in Walls be Measured? F. G. Hechler (*Contributed by A.S.R.E.*).
Effect of Pipe Lengths on Orifice Coefficients, A. J. Wood (*Contributed by A.S.R.E.*).

Railroad Session (II)

(Under auspices of Railroad Division)

Heating and Ventilating of Passenger Cars, Edward A. Russell.
Vibration of Bridges, S. Timoshenko.
Discussion of Progress Report of Division.

Hydraulic Session

Symposium on Centrifugal Pumps

(Under auspices of Hydraulic Division)

Progress in Hydraulics, A Report of the Hydraulic Division, presented by Geo. A. Orrok.
Centrifugal Pumps, H. T. Davey.
A New Method of Separating the Hydraulic Losses in a Centrifugal Pump, M. D. Aisenstein.
A Method of Analyzing the Performance Curves of Centrifugal Pumps, Joseph Lichtenstein.

Wednesday Morning, December 7

Photography Session

(Joint Session with Optical Society of America)

General Applications of Photography to Mechanical Engineering, C. E. K. Mees.
Photomicrography and Its Application to Mechanical Engineering, F. F. Lucas.
X-Ray Examination of Structural Materials, Wheeler P. Davey.

Fuels Session

(Under auspices of Fuels Division)

Progress in Fuels, A Report of the Fuels Division, J. T. Ward and R. T. Haslam. (Presented by Professor Ward.)
The K.S.G. Process of Low-Temperature Carbonization, Walter Runge.

Machine-Shop Practice Session (III)

(Under auspices of Machine-Shop Practice Division and Machine-Tool Congress)

Progress in Machine-Shop Practice, A Report of the Machine-Shop Practice Division, presented by L. C. Morrow.
The Development of Machine Tools from a User's Viewpoint, F. C. Spencer.

Session on Materials Handling

(Under auspices of Materials Handling Division)

Progress in Materials Handling, A Report of the Materials Handling Division, presented by H. J. PAYNE.

Materials Handling as an Aid to Production, FRANK L. EIDMANN.

Operating Costs of Electric Industrial Trucks and Tractors, C. B. CROCKETT.

Wednesday Afternoon, December 7

Session on Education and Training for the Industries of Non-College Type

(Under auspices of Committee on Education and Training for the Industries)

Apprentice Training for Draftsmen, C. J. FREUND.

Principles of Apprenticeship Organization, BEN S. MOFFATT.

Steam Tables Research

Report of Executive Committee, Steam Table Fund, presented by GEO. A. ORROK.

Progress Reports on the Work of the Steam Table Fund, N. S. OSBORNE, L. B. SMITH, J. H. KEENAN, HARVEY N. DAVIS, and E. L. ROBINSON.

Thursday Morning, December 8

Session on Central-Station Power

(Under auspices of Power Division)

Progress in Steam Power Engineering, A Report of the Power Division, presented by JOHN A. HUNTER.

Properties of Ferrous Metals at Elevated Temperatures as Determined by Short-Time Tensile and Expansion Tests, A. E. WHITE and C. L. CLARK (*Read by title*).

Some Factors in Furnace Design for High Capacity, E. G. BAILEY.

Some Operating Data of Large Steam-Generating Units, HENRY KREISINGER and T. E. PURCELL.

Management Session (I)

(Under auspices of Management Division with American Management Association cooperating)

Progress in Management Engineering, A Report of the Management Division, presented by C. W. LYTLE.

Control of Factory Overhead, H. G. PERKINS.

Production Control in a Wrought-Brass Mill, W. R. CLARK and ARTHUR BREWER.

General Session (II)

Analysis of Strains and Stresses in a Wrist-Pin, GUY B. COLLIER (*Read by title*).

Measurement of Flow of Air and Gas with Nozzles, S. A. MOSS.

Destruction Test of a 66-In. Forged Steel Penstock Pipe, JOHN L. COX.

Thursday Afternoon, December 8

Management Session (II)

(Under auspices of Management Division with American Management Association cooperating)

Budgetary Control, J. P. JORDAN.

Some Essential Principles for Budgetary Control, H. V. COES.

Boiler Feedwater Session

(Under auspices of Power Division and Joint Research Committee on Boiler-Feedwater Studies)

Progress Reports of Executive Committee and of Seven Sub-Committees of the Joint Research Committee on Boiler-Feedwater Studies:

Progress Report of Executive Committee with Outline of Plan and Scope for Future Work, S. T. POWELL.

Design and Operation of Deconcentrators and Continuous Blow-Down Apparatus, Sub-Committee No. 1, R. C. BARDWELL.

Water Softening by Chemicals, with Special Reference to Combined Systems, Sub-Committee No. 2, C. R. KNOWLES.

Studies on Priming and Foaming of Boiler Waters with Special Reference to Railroad Practice, Sub-Committee No. 3, C. W. FOULK.

Corrosion of Boilers and Appurtenances, and Plan and Scope of Future Work, Sub-Committee No. 5, F. N. SPELLER.

The Effect of Industrial Wastes on Boiler-Feedwater Problems and Condenser Operation, Sub-Committee No. 7, V. B. SIEMS.

Standardization of Water Analyses with Recommendations for the Determination of Dissolved Oxygen, CO_2, and Hydrogenation Concentration, Sub-Committee No. 8, HAROLD FARMER.

Bibliography of Boiler Feedwater with a Review of the Work during the Past Year, Sub-Committee No. 9, G. A. STETSON.

Session on Oil and Gas Power

(Under auspices of Oil and Gas Power Division)

Efficiencies of Otto and Diesel Engines, F. O. ELLENWOOD, F. C. EVANS and C. T. CHWANG.

Diesel Engines for Locomotives, R. HILDEBRAND.

Presentation of the Rudolph Diesel Award for Best Paper Delivered during Oil and Gas Power Week, 1927, to WILLIAM F. JOACHIM.

Progress in Oil and Gas Power, A Report of the Oil and Gas Power Division, presented by P. H. SCHWEITZER.

Research Session

Symposium on Lubrication

(Under auspices of A.S.M.E. Special Research Committee on Lubrication)

Viscosity of Lubricants under Pressure, MAYO D. HERSEY and HENRY SHORE.

The Effect of Running In on Journal-Bearing Performance, S. A. MCKEE.

An Investigation of the Performance of Waste-Packed Armature Bearings, G. B. KARELITZ.

Progress in Lubrication Research, A Report of Special Committee on Lubrication, presented by A. E. FLOWERS.

REGIONAL MEETINGS

Kansas City, Mo.

April 4-6, 1927

The first regional meeting for 1927 was held at Kansas City, Mo., April 4 through 6, with headquarters at the Baltimore Hotel. The program consisted of an all-day meeting of the Council on the first day, entertainment features and excursions, and technical sessions.

On Monday evening a very enjoyable dinner dance was held at the Baltimore Hotel. A luncheon at the Kansas City Athletic Club, held under the auspices of the local sections of the several national engineering societies, preceded inspection trips Tuesday afternoon to the Northeast Station of the Kansas City Power & Light Co., the North Kansas City waterworks plant, the Standard Oil Company's Sugar Creek refinery, the Sheffield Steel Company's plant, and the America Radiator plant. Other events of the day were a theater party for the ladies in the afternoon, and a banquet at the Baltimore in the evening, at which speeches were made by Past-Presidents of the Society and prominent members of the Council. A tour of the city's beautiful parks and residential sections on Wednesday afternoon brought the meeting to a close.

The ladies program also included excursions to the Loose-Wiles Biscuit Co., H. D. Lee Co., and Procter & Gamble Co.

The technical program of the meeting was as follows:

Monday Afternoon, April 4

Session on Education and Training for the Industries

(Under auspices of Committee on Education and Training for the Industries)

Railway Apprenticeship in a National Apprenticeship Plan, F. W. THOMAS
Industrial Problems or Difficulties, L. A. HARTLEY
Education for the Industries, P. F. WALKER

Tuesday Morning, April 5

Petroleum Session

(Under auspices of Petroleum Division)

Drilling and Pumping-Rig Equipment, GLENVER MCCONNELL
Electrical Applications in the Oil Fields, D. M. MCCARGAR
Lubrication of Diesel Engines, Correct and Incorrect Methods of Oil Application, W. O. NORTHCUTT

Management Session

(Under auspices of Management Division)

Industrial Management, JAMES MCQUEENEY
The Management of Railway Shops and Terminals, WM. R. HARRISON
Personnel Administration in the Steel Industry, F. V. LARKIN

Power Session

(Under auspices of Power Division)

Treatment of Feedwater for Industrial and Power-Plant Boilers, S. T. POWELL
Present Tendencies of Steam-Station Design, V. E. ALDEN
Symposium on Steam-Power Plant Development in the Middle West

Joint Session

(Under auspices of Kansas City Local Section)

Kansas City Industrial Development, LOU HOLLAND

Wednesday Morning, April 6

Fuels Session

(Under auspices of Fuels Division)

Low-Temperature Distillation, WALTER RUNGE
Burning of Midwestern Fuels, E. L. MCDONALD
Industrial Furnace-Fundamentals, VICTOR J. AZBE
Production and Distribution of Fuel, C. M. YOUNG

Kansas City Session

(Under auspices of Kansas City Local Section)

Protection of Flour Mills and Grain Elevators against Fire and Explosion, F. D. HOXIE
Mechanical Engineering in the Flour-Milling Industry, M. D. BELL
Some Applications of Machinery as Applied to Agriculture, O. B. ZIMMERMAN

Seattle, Wash.

August 29-31, 1927

The Seattle Regional Meeting, held August 29, 30, and 31, with headquarters at the new Olympic Hotel, drew members all the way from Vermont and other eastern states, and had an attendance of about 150. In addition to the technical sessions, there were meetings of the Council on Monday and Tuesday mornings for the transaction of Society business, special luncheons on Monday and Tuesday, a banquet and dance Tuesday evening, and a number of splendid excursions and inspection trips.

At the Monday luncheon, which was with the Council, Mr. Rice acted as master of ceremonies.

At the Tuesday luncheon Dean Dexter S. Kimball, of Cornell University, Past-President of the Society, gave a highly interesting talk to 150 business men of the Seattle Chamber of Commerce, Manufacturers' Association and similar interests. He sketched with his usual broad strokes the complexities of recent developments, and the need of adding specialized knowledge to legislation and management, if our great national problems are to be solved.

Over a hundred members and guests were entertained at the banquet Tuesday evening. The toastmaster, Roy Wright, of New York, Vice-President of the Society, already known for his charm on such occasions, was introduced by Professor Eastwood, chairman of the Regional Meeting Committee. The two honor guests of the banquet, Mayor Bertha Landes of Seattle and Mayor Tennant of Tacoma, welcomed the engineers.

The principal speaker of the evening was Prof. Edward S. Meany of the University of Washington, who spoke on "The Northwest in History." He gave the visiting engineers and guests many intimate details, even personal experiences, of the early days in Oregon Territory.

Monday and Tuesday afternoons were given over to inspection trips to the Washington Iron Works, Boeing Airplane Plant, the huge Port Commission Terminals, and electrified sawmills. Each excursion supplemented the topics presented at the technical sessions in the morning. These trips were followed by a refreshing scenic drive.

The excursion on Wednesday, August 31, around part of the beautiful Hood Canal and Olympic Peninsula country, included a visit to the Lake Cushman dam and power plant recently completed by the city of Tacoma. Here the Tacoma officials, as hosts, presented the final picture of the meeting on Western Engineering Development. Some 45 to 50 enjoyed an excellent beach luncheon at Alderbrook Inn and then completed the series of rides and ferry trips, returning across Puget Sound in the evening. The program was run to perfect schedule without delay or lagging interest.

The papers presented at the technical sessions Monday and Tuesday mornings dealt with various industries in the Far West, and the two sessions were very well attended. The programs follow:

Monday Morning, August 29

The Pulp and Paper Industry and the Pacific Northwest, C. C. Hockley
Investigation of Pulp and Paper Industry in State of Washington, S. Konzo and B. W. Ross
The Selection and Operation of Pumping Equipment in the Petroleum Industry, H. P. Vail
Gas Lift as Applied in Oil Production, F. W. Lake
A Smoke Density Meter, Frank Sawford

Tuesday Morning, August 30

Harbor Machinery, MARK R. COLBY
Cargo Cranes, BERNARD DUNELL
Beet Sugar Manufacture, WILFRED Y. CANNON
Sugar Warehouse Conveying Systems, J. T. BUZZO
Railway Roller Bearings, W. C. SANDERS
Performance Data on Centrifugal Fans, G. S. WILSON, H. J. MCINTYRE, and W. L. DUDLEY (*Read by title*)

NATIONAL MEETINGS

Aeronautic Division

Buffalo, N. Y.—April 25-26, 1927

The first National Meeting of the Aeronautic Division of the Society was brought to a close on Tuesday afternoon, April 26, 1927, after a most successful two-day convention in Buffalo, N. Y. It was held under the auspices of the Buffalo Section, with headquarters at the Statler Hotel.

There were two technical sessions with programs as follows:

Monday Morning, April 25

Opening Remarks, A. H. LANE
Address of Welcome, HON. FRANK X. SCHWAB
Transport Airplanes, ANTHONY H. G. FOKKER
Importance of Aerodynamic Safety in Aviation, HARRY F. GUGGENHEIM

Tuesday Morning, April 26

Apparent Present Tendencies in Airplane Design, V. E. CLARK
Metallurgy of Aircraft Engines, BISHOP CLEMENTS
Development of the Buffalo Airport, JOHN M. SATTERFIELD

Inspection Trips

Following the morning session, Monday, there was an inspection trip to the Curtiss Aeroplane & Motor Plant, where among the many things of interest the machine shop won high approval. The Consolidated Aircraft Plant inspection tour which followed proved equally interesting. This company is the successor of the Dayton-Wright concern, and has a modern factory, principally devoted to building standard training airplanes for Government service.

On Tuesday afternoon a trip was made to the Municipal Airport. The large Ford all-metal airplane was held for inspection before it left on its return trip to Detroit, and an opportunity was given to everyone to examine the plane inside and out. The plane was loaded with

1403 lb. of freight and was under the charge of its pilot, Edward Brooks. The take-off of the plane was perfect and a sight worth remembering. The many different types of planes parked in the hangars made the whole trip through the Airport decidedly worth while. Lieut. Reuben Biggs and Lieut. E. E. Aldrin, chairman of the Aeronautic Division, gave an exhibition of stunt flying, using a "Trusty" preliminary training plane of the Army.

From the Airport the visitors were taken to the plant of the Eberhart Aeroplane & Motor Corporation where they were afforded an opportunity to inspect a Navy battleship fighter plane that was in the process of construction.

The Banquet

At the banquet on Monday evening H. Ralph Badger, aviation governor of New York State in the National Aeronautic Association, was toastmaster and introduced Elmer A. Sperry, who represented President Schwab and delivered the following message from him: "Air transportation will develop all the relations between the people of one nation and between all nations to an even greater extent than did the railways. I wish you would announce for the Society that it will put its energies into developing this science both by research and special meetings and particularly by special publications."

Mr. Sperry spoke on the "Necessity of Developing a Heavy-Fuel-Oil Aero Engine." The Rev. G. A. Leichliter of Buffalo gave an amusing talk entitled "Lighter than Air." The last speaker was William P. McCracken, Assistant Secretary of Commerce in charge of aviation, who spoke on "Commercial Air Transportation."

National Defense Division

West Point, N. Y.—May 12, 1927

The National Defense Division of the Society, with the cooperation of a number of other organizations, held its first National Meeting on May 12, 1927, in the form of a special excursion to West Point. The Hudson River Day Line steamer *Alexander Hamilton* was chartered for the occasion and the number to go limited to one thousand that the trip might be made in comfort. The quota was filled quickly.

Amid the salutes of the warships at anchor on the Hudson and the music of their bands, a tribute acknowledged from the bridge by President Charles M. Schwab and Colonel Benedict Crowell, president of the Army Ordnance Association, the boat passed swiftly up the lower Hudson to the Bear Mountain bridge, a splendid view of which could be had from the river below,

The West Point Program

Reaching West Point a little after one o'clock, the party became the guests of Brigadier-General Merch B. Stewart, Superintendent, who made a short speech of welcome. From then until the last person stepped on the boat for the return trip, events were run off with true military precision, following the program to the letter as well as to the minute, and yet with no rushing or flurry.

Groups of thirty or so, taken in charge by officers who had offered their services, were skillfully piloted through the mazes of the machinery of the national Military Academy. The tour covered the dormitories; Philosophy Museum and Library; Riding Hall; Cullom Memorial Hall, with its tablets to all graduates killed in action; Trophy Point, the scene of cadet summer encampments; the gymnasium, with its swimming pool and special rooms for fencing, boxing, and wrestling; and the Chapel, where one of the cadets gave a brief organ recital.

After viewing the famous Regimental Parade the guests completed the day at the Point with a trip through the Ordnance Museum, containing relics and models dating from the fifteenth century as well as the 3-inch gun that fired the first American shot in the World War, and through the Mess Hall with its long tables set for supper. President Schwab made a brief speech to the cadets in the Mess Hall. His address, entitled "Industrial Mobilization for National Defense," was published in the November, 1927, issue of *Mechanical Engineering.*

Luncheon and dinner were both served aboard the *Alexander Hamilton,* and the evening trip down the river, with music and dancing, was most enjoyable.

Participating Societies

Cooperating with the National Defense Division of the Society on this trip were the American Chemical Society, the American Electrochemical Society, American Engineering Council, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, The American Society of Mechanical Engineers, Army Ordnance Association, Associated Business Papers, and Society of Automotive Engineers.

The Committee on Arrangements was headed by B. C. McClure as general chairman, with James L. Walsh, chairman of West Point Arrangements; Irving Fellner, chairman of General Publicity, Advertising, etc.; R. A. Langworthy, chairman of Dancing, Music and Entertainment; P. R. Faymonville, chairman of General Information, and F. A. Scheffler, chairman, and Mrs. J. T. Lawson, vice-chairman, of Acquaintanceship.

Machine-Shop Practice Division

New Haven, Conn.—September 7-9, 1928

The first National Meeting of the Machine Shop Division was held during the Seventh Annual New Haven Machine Tool Exhibition, under the auspices of the New Haven Section. The various technical sessions were so scheduled as to allow plenty of time for inspecting the Exhibition, were of high caliber, well attended, and stimulated active discussion. The programs for these sessions were as follows:

Wednesday Morning, September 7

Session on Machine-Shop Economics

The Economics of Machine-Tool Replacement, MYRON S. CURTIS
Shop-Equipment Policies in Representative Plants, L. C. MORROW

Thursday Morning, September 8

Session on Finishing

Modern Finishes for Machine Tools, W. R. ATWOOD
The Prerequisites of Successful Polishing, BRADFORD H. DIVINE

Foremanship Training Session

Improvement of Foremanship by the Conference Method, C. F. KLINEFELTER
Education for Foremanship, JAMES A. MOYER

Friday Morning, September 9

Session on Metal Working

Improvement in Copper Wire Mill Equipment, SAMUEL MCMULLAN
The Manufacture and Application of Extruded Copper Tubes, GEO. A. FOISY

Session on Anti-Friction Bearings

Recent Developments in the Application of Anti-Friction Bearings to Machine Tools, R. F. RUNGE
Anti-Friction Bearings in Ordnance Work, FRANK BRAUER

An informal Round Table Discussion of Punch-Press Practice, Holding Devices, Safety and Compensation and Modern Finishing Processes took place at a dinner at the Lawn Club on Wednesday evening.

New England Industries Dinner

An unusual feature in connection with the Exhibition was the New England Industries Dinner held on Thursday evening, September 8. This was staged through the joint efforts of the New England Council,

the Manufacturers' Association of Connecticut and a New Haven Committee representing the New Haven Chamber of Commerce and the Local Section of the A.S.M.E. The object of the dinner meeting was to drive home to New England manufacturers the vital need of sweeping re-equipment programs in the older industries of the eastern states. It attracted wide attention and drew over two hundred executives, largely representative of the metal-working industries of New England.

E. Kent Hubbard, president of the Manufacturers' Association of Connecticut, presided. The speakers formed an unusually powerful group and were: Governor John H. Trumbull of Connecticut; Charles R. Gow, statistician and president of the Gow Co., Inc., Boston; Clayton R. Burt, vice-president and general manager of the Pratt & Whitney Co., Hartford; Vice-President Charles E. Newcomb of the A.S.M.E., manager of the Worthington Pump and Machinery Corp., Holyoke; and L. W. Wallace, executive secretary of the American Engineering Council, Washington, D. C.

Printing Industries Division

New York, N. Y.—September 14, 1927

The Printing Machinery Division Luncheon Meeting at the Commodore Hotel, New York, N. Y., on September 14, held under the auspices of the Metropolitan Section of the Society, was attended by nearly two hundred engineers and executives in the field of graphic arts. This meeting, which was the first National Meeting of the Division, was held during the National Graphic Arts Exposition, and had for its general subject "Engineering in the Graphic Arts."

The meeting was opened by William C. Glass, chairman of the Division, who introduced John Clyde Oswald, managing director of the New York Employing Printers' Association, as toastmaster of the occasion. The first speaker was Erik Oberg, treasurer of the Society and President Schwab's representative at the meeting. For the benefit of the non-members present he outlined the possibilities at hand for the Divisions of the Society, especially those of Printing Machinery and Management, to cooperate with trade organizations of the graphic arts. The secretary of the Society, Calvin W. Rice, then spoke briefly on the values of the present Graphic Arts Exposition and of the necessity for having permanent technical museums.

Professor Roe and Doctor Eilert the Main Speakers

Prof. Joseph W. Roe, of New York University and member of the Standing Committee on Professional Divisions, addressed the luncheon, taking the place of the Hon. Geo. H. Carter, Public Printer, who was

to have spoken. Mr. Carter was prevented from attending by serious illness. Professor Roe talked on the "Need of Engineering in Graphic Arts." He outlined the development of scientific management from the time of Taylor and stressed the special need of scientific management in an industry such as printing, with its great percentage of small job lots.

Dr. Ernest F. Eilert, president of the United Typothetae of America, was the other main speaker and his topic was on the "Educational Program of the United Typothetae of America."

Other organizations which cooperated in this meeting were the American Newspaper Publishers Association, Association of Cooperative Colleges, Employing Bookbinders of America, International Association of Printing House Craftsmen, International Association of Electrotypers, International Printers Supply Salesmen's Guild, International Trade Composition Association, National Graphic Arts Association, Society for the Promotion of Engineering Education, and United Typothetae of America. The Committee on Arrangements, under the chairmanship of Edward Pierce Hulse, consisted of Ed. E. Bartlett, Wm. M. Kelly, John H. Williams, W. E. Wines, James J. Phalen, I. F. Niles, C. F. Hart, J. O. Gibbons, Jos. S. Pecker, H. E. Vehslage, and Wm. C. Glass.

Fuels Division

St. Louis, Mo.—October 10-13, 1927

Over 700 attended the first National Meeting of the Fuels Division, held at the Hotel Statler, St. Louis, Mo., October 10 through 13, 1927.

The meeting was formally opened at 10: 30 o'clock Monday morning with an address by City Registrar J. H. Grosse, who delivered the greetings of Major Victor J. Miller. Following Mr. Grosse, S. W. Parr, Professor of Applied Chemistry, University of Illinois, delivered an address on "Fuels, Past and Prospective."

This address served as a spendid introduction to the technical sessions, the programs for which were as follows:

Monday Afternoon, October 10

General Session

American Fuel Resources, O. P. Hood

Combustion and Heat Transfer, R. T. Haslam and H. C. Hottel

Recent Developments in Low-Temperature Coal Carbonization, H. D. Savage

Tuesday Morning, October 11

Industrial Session

The High Cost of Fuel Saving, W. TRINKS
Application of Powdered Coal to Small Boilers of Industrial Plants, HENRY KREISINGER

General Session

The Clinkering of Coal Ash as Related to Laboratory Fusibility Determinations, A. C. FIELDNER, W. A. SELVIG, AND P. NICHOLLS
Factors Governing the Purchase of Coal, MORGAN B. SMITH
Properties of Refractories and Their Relation to Conditions in Service, STUART M. PHELPS

Tuesday Afternoon, October 11

Power Plant Session

The Characteristics of Modern Boilers. E. R. FISH
Direct-Fired Powdered-Fuel Boilers with Well-Type Furnaces at Charles R. Huntley Station, H. M. CUSHING AND R. P. MOORE

Wednesday Morning, October 12

Industrial Session

Progress in Gas-Producer Practice, WM. B. CHAPMAN
The Use of Fuels in Brick Kilns, W. E. RICE
The Burning of Liquid Fuel, ERNEST H. PEABODY

Power Plant Session

The Characteristics of Modern Stokers, F. H. DANIELS
The Economics of Air-Preheater Applications, FRANK M. VAN DEVENTER
Automatic Combustion Control, T. A. PEEBLES

Wednesday Afternoon, October 12

General Session

The Preparation of Coal with Special Reference to Quality, WILLIAM BEURY
Economics of Dry-Quenching Coke by the Sulzer Process, A. M. BEEBEE
Railway Smoke Abatement, J. B. IRWIN

Thursday Morning, October 13

Smoke-Abatement Session

The Measurement of Atmospheric Pollution, Visible and Invisible, GEORGE T. MOORE
Smoke-Abatement Methods Used in Cleveland, ELLIOTT H. WHITLOCK
Organizing a Smoke-Abatement Campaign, ERLE ORMSBY

Thursday Afternoon, October 13

Smoke-Abatement Session

Smokeless and Efficient Firing of Domestic Furnaces, VICTOR J. AZBE
The Effect of Atmospheric Smoke Pollution, A. S. LANGSDORF

All sessions were well attended, and provoked unusually lively discussion. As St. Louis was one of the first cities to adopt smoke-prevention measures, the sessions dealing with this subject were particularly successful.

Excursions and Plant Visits

Although sessions were held both morning and afternoon, a number of plants were inspected by the visiting engineers. Instead of the usual plan of conducting an organized tour, the Local Committee introduced an innovation in the shape of a flexible program adaptable to the requirements of the visitors. A list of plants open for inspection was posted at registration headquarters and guides and transportation furnished small groups for whatever trips they desired to make.

Entertainment

The outstanding events of the social program were the buffet supper, smoker and entertainment on Monday evening, and the dinner dance on Tuesday evening. The entertainment committee for Moday evening provided a novel program of music and stunts which seemed to be thoroughly enjoyed by all.

The dinner program consisted of a series of short talks, splendid music, and dancing. O. P. Hood, chief mechanical engineer of the United States Bureau of Mines, acted as toastmaster, and talks by Past-President John Lyle Harrington, President Schwab's representative at the meeting, Col. H. D. Savage, Past-President W. L. Abbott, and Philip Moore, Past-President of the A.I.M.E., preceded the principal address of the evening, which was delivered by L. W. Wallace, Executive Secretary of the American Engineering Council. Mr. Wallace discussed the important part played by fuels in our international affairs, and showed the great and imperative need for the guiding hand of the engineer who is not politically involved in the affairs of the nations participating in the struggle for fuel supremacy.

Program for the Ladies

The ladies' program included, in addition to the dinner dance, a theater party Monday evening parallel to the smoker, special luncheons, a card party Wednesday afternoon, and several interesting automobile trips.

Council Meeting

The first Council Meeting of the fall season was held in St. Louis on Saturday evening, October 8, 1927, preceding the meeting of the Fuels Division.

In the absence of the President, Vice-President Roy V. Wright presided. A number of matters were decided, the most important being the action of the Council authorizing the Committee on Publications and the Finance Committee to proceed with the expansion of the Engineering Index service.

The second important transaction of the Council was the decision that the Fiftieth Anniversary of the Society would be celebrated during the week of April 7, 1930.

A Regional Meeting in the fall of 1928 was awarded to Minneapolis and St. Paul, the proposed Professional Division on Applied Mechanics was approved, and a few committee appointments were made.

Upon recommendation of the Committee on Awards, the Junior Award was given to William M. Frame and the Student Awards to Messrs. Roger I. Eby and Alfred H. Marshall. The subject for which the Charles T. Main Award for 1928 was offered was announced as "Scientific Management and Its Effect on Manufacturing." Dr. Hollis, chairman of the Committee on Awards, reported that six students were receiving financial assistance from the Max Toltz Fund.

Col. Paul Doty, in compliance with the Rules of the Society, reported the division of the Local Sections into seven groups, each of which would be responsible for nominating one member of the Nominating Committee for 1928.

Wood Industries Division

Grand Rapids, Mich.—October 17-18, 1927

The second National Meeting of the Wood Industries Division was held at Grand Rapids, Mich., October 17 and 18, 1927, under the auspices of the Peninsula Local Section of the Society, and with the cooperation of the Grand Rapids Engineering Society. It was attended by more than 200 engineers and executives interested in the woodworking industry. Headquarters for the meeting were at the Hotel Pantlind. Grand Rapids, as the Furniture Capital of America, gave the visitors an unusual opportunity to inspect many modern woodworking plants. The tours were arranged for the morning of the first day of the meeting and the afternoon of the second day.

Three technical sessions were held with programs as follows:

Monday Afternoon, October 17

Opening Remarks, R. K. MERRILL

Problems of Design for Mass Production in the Furniture Industry, BAYARD RICHARDSON

Static Loads upon Bus Bodies, CHARLES B. NORRIS AND JOSEPH A. POTCHEN

Improvements in Handling Methods in the Woodworking Industry, R. K. MERRILL AND G. H. RODERICK

Monday Evening, October 17

Informal Dinner Session

Lumber Standards—Their Relation to the Wood Industries, JOHN W. BLODGETT

The Need of Research on Tropical Woods before Marketing Them, ARTHUR KOEHLER

Tuesday Morning, October 18

Compressive Tests of Balsa Wood, A. H. STANG

Some Physical Properties of Balsa Wood, S. VAN DUSEN

Lacquer and Varnish Films, PAUL S. KENNEDY

The meeting brought out two very marked developments in woodworking. The first was the improvement of production methods, especially in the handling of materials and in the possibilities of line production for mass manufacture. The other development lay in the keen interest exhibited for the need of research. Two special research committees of the Society held conferences. The Special Research Committee on Saws and Knives met Monday morning, and a luncheon meeting of the Special Research Committee on Tropical Hardwoods took place Tuesday. Most of the papers presented at the meeting dealt with experimental and research work that had been accomplished. All of which points to the increase of engineering methods in the woodworking industries.

The dinner meeting was a very successful gathering, combining, as it did, a well-rounded technical program with a pleasant get-together. At this meeting a resolution was passed urging energetic program of Federal reforestation and favoring research on available timber supply that can meet our industrial requirements until such time as reforestation brings back to the country its heritage of timber. It also favored the passage of the McSweeney bill on reforestation.

Management Division

Rochester, N. Y.—October 26-27, 1927

A two-day conference on management problems held at the Hotel Sagamore, Rochester, N. Y., October 26 and 27, 1927, drew engineers, managers, and executives from twelve states, with representatives from as far West as Colorado and as far South as Virginia. It acted as a focus point, so to speak, of the many meetings held during Management Week, October 24 to 29, all over the country, and was the first National Meeting of the Management Division. The splendid cooperation of the Rochester Engineering Society, the American Management Association, and the Rochester Industrial Management Council helped materially to make the meeting successful.

Technical papers were presented as follows:

Wednesday Morning, October 26

Coordinating Wage Incentives and Production Control

Opening Remarks, RONALD C. HANDS
Coordinating Wage Incentives and Production Control, OSCAR GROTHE
Coordinating Wage Incentives and Production Control, D. B. CHARTERS
Production Control Methods in the Rubber Industry, F. B. CALHOUN

Wednesday Afternoon, October 26

Coordinating Quality Control and Production Control

The Control of Quality in a Manufactured Product, JAMES H. MARKS
Control of Quality, WALTER W. GRAEPER
Coordinating Quality Control, W. K. MCAFEE

Wednesday Evening, October 26

Informal Dinner Session

(In Charge of Rochester Management Week Committee)
Management's Contribution to Prosperity in Industry, GANO DUNN

Thursday Morning, October 27

How to Determine Expenditures in Material Handling Equipment, GEORGE E. HAGEMANN
Economic Production Quantities, FAIRFIELD E. RAYMOND
Determination of Minimum Cost Purchase Quantities, R. C. DAVIS

Thursday Afternoon, October 27

Plant Location, TYLER S. ROGERS
An Industrial Plant Location Study, EMMETT B. CARTER
An Example of Plant Location Study, CHAS P. WOOD
Discussion on Locating Plants in Foreign Countries, EDWARD G. MINER

Among the plants open for inspection during the meeting were the Eastman Kodak Company, The North East Electric Co., the Stromberg-Carlson Mfg. Co., the General Railway Signal Co., the Taylor Instrument Company, Bausch & Lomb Optical Co., and The Gleason Works.

Iron and Steel Division

Youngstown, Ohio—November 10, 1927

The first national meeting of the newly organized Iron and Steel Division held at the Hotel Ohio, Youngstown, Ohio, November 10, 1927, with an attendance of 800, surpassed the records of all other 1927 divisional meetings. Every iron and steel center was represented, Cleveland leading with 204 representatives and Pittsburgh giving a close second with 148. The Youngstown district would have had the largest number of representatives, but the local engineers gave up their places at the dinner to accommodate the out-of-town guests.

Technical Session Great Attraction

So great was the interest in the papers and discussion that over five hundred attended the technical session which opened the meeting Thursday morning.

The first paper on "Super-Refractories" by Stuart M. Phelps, director of research and tests, Refractories Fellowship, Mellon Institute, Pittsburgh, was of special interest both to the iron and steel engineers and to the power engineers. Professor Trinks, G. G. Coolidge, M. J. Terman, and President-Elect Dow were among those who contributed to the discussion.

The second paper on the "Developments in Four-High Rolling Mills," which was presented by F. C. Biggert, Jr., president of the United Engineering and Foundry Co., dealt with a subject of outstanding interest to all metal-working industries and drew to Youngstown engineers from all ferrous and non-ferrous mills. Mr. Biggert contributed a paper of exceptional value to the new iron and steel divisions. Discussions had been prepared on the subject by Lloyd Jones, E. W. Bliss Co., R. J. Wean, vice-president, Aetna Standard Engineering Co., and Charles L. Huston, vice-president, Lukens Steel Co.

Plant Inspection Tours

The opportunity to visit local plants Thursday afternoon was much appreciated. Over 250 went to the Youngstown Sheet and Tube Co.'s plant to see the new Pilger mill in operation, and a large delegation went to Warren, Ohio, to see the four-high rolling mill of the Trum-

bull Steel Co., which has been in operation only since June 15, 1927. The other plants, Republic Iron and Steel Co., Truscon Steel Co., General Fireproofing Co., and Carnegie Steel Co., Ohio works, all had their share of visitors.

Dinner

Providing accommodations at the informal dinner Thursday evening presented a most difficult task to the committee. The banquet room would accommodate only 450 for dinner, 700 with the tables removed. The Youngstown engineers graciously gave up their places to visitors, holding their dinner at the Youngstown Club, and 100 of the visitors were served in the main dining room. Later, they all came together for the speeches.

C. S. Robinson as toastmaster performed well his task of introducing the speakers of the evening, Charles M. Schwab, William L. Abbott, Alex Dow, and James A. Campbell. Mr. Schwab spoke of the need of cooperation in the industry and the importance of maintaining wages at their present level even though prices were falling. Mr. Dow gave an interesting address on economic conditions with particular emphasis on the increase in man-hour output during the last 15 years. He said that he felt that in many industries we would have reached the limit of greater mechanical efficiency within the next ten years with its resultant increase in man-hour output, and the problem of maintaining wages with falling prices would be the great problem for engineers. Mr. Abbott spoke on the need of cooperation between power and iron and steel.

This first meeting of the new Division was held under the joint auspices of the following sections: Akron, Buffalo, Birmingham, Chicago, Cleveland, Columbus, Detroit, Erie, Lehigh Valley, Philadelphia, Pittsburgh and Toledo. The Youngstown Engineering Society was responsible for arranging the details of the meeting and deserve great credit for the splendid success.

Reports of Committees

THE reports of the Standing Committees of Council and of the Special Boiler Code Committee for the fiscal year 1926-1927, as presented at the 1927 Annual Meeting of the Society, are given on the following pages.

REPORTS OF COMMITTEES

Finance[1]

The comparative condensed Balance Sheets and Financial Statements herewith submitted (see pages 123-125) reveal the net change in the various items for the fiscal year ending September 30, 1927, and the sound financial condition of our Society.

In so far as the Balance Sheet is concerned, the outstanding differences, on the asset side, pertain to—

1 Cash
2 Trust Funds
3 Investment for Capital Account

Cash. The cash position reflects very largely the policy of having all funds on an interest-earning basis as far as is practicable.

Trust Funds. The increase in trust funds reveals to a large degree the confidence which our members, and in some cases non-members — in fact, industry — have in the Society and its facilities to further some specific purpose they have in mind for the advancement of engineering, the engineering profession, and industry.

The increase in the trust funds is comprised mainly of two funds that were received during the fiscal year:

(a) Lincoln Arc Welding Prize Fund..... $17,500.00
(b) John R. Freeman Fund..... 25,044.00

Nine new trust funds for research were set up during the fiscal year. Our Accounting Department provides each Research Committee with a quarterly statement of the condition of the fund.

Investment for Capital Account. This account reflects the result of a definite policy on the part of the Society to have available a reserve of working capital to permit it to carry out long-time plans, and the continuation of its important work in the event that business conditions at any one time should temporarily curtail its income.

Even though the Society's operations are conducted without financial profit to its members, yet it is a business and as such many of the sound principles of business are applicable and necessary to the proper conduct of its affairs. A well-run business aims to have adequate working capital together with a surplus that permits it adequately to finance current operations and extensions for the future. That is the primary reason for building up the Society's invested capital account; it is a fundamental principle of good business.

Income. The Excess of Income over Expenditures for 1927 was $62,215.48, of which $29,443.69 came from Initiation Fees and the balance reflects budgetary regulation of operating expenses, commented on in more detail later in this report.

[1] NOTE: A more detailed report was presented by the Finance Committee and is in the archives of the Society.

Liabilities. On the liability side of the Balance Sheet the outstanding differences are—

1 Unfilled Obligations and Accounts Payable
2 Trust Funds
3 Capital Account

Capital Account. The increase in the Capital Account is almost entirely due to the increase in investments for that account, since the increase in Fixed Assets is only a nominal amount. This increase in liquid assets has already been commented upon in our discussion of the assets side of the Balance Sheet.

Under Income it should be noted that there was a gain of $27,260.95 as follows:

Budgeted Gross Income	$688,900
Budgeted Expenses	653,331
Net Balance	$35,569
Actual Gross Income	$727,618.41
Actual Operating Expenses	664,788.46
Actual Net Balance	$62,829.95

or an increase in realized Net Income over Budgeted Net Income of 76.3 per cent. Of this $62,829.95, however, $29,443.69 came from initiation fees. The balance of $33,386.26 was mainly realized from Publications.

The Actual Operating Expenses were $664,788.46 and the Budgeted Expenses were $653,331.00, an increase of $11,457.46 or 1¾ per cent so that in permitting a net variation in our Budgeted Expenses of 1¾ per cent to adopt recommendations by the Publications' Committee and the Staff we raised our Net Income, as estimated from the Budget of $35,569.00 to $62,829.95, or $27,260.95.

Under the management policy as reflected by the Budget the Net Income from Publications and Sales would have been $5,569.00, since $30,000.00 of the $35,569.00 Budgeted Net was from initiation fees, which under a ruling of Council automatically goes to Net Income and is not budgeted.

New Financing. Probably the most outstanding development which the Society has undertaken for service to the public, for the advancement of research, industry and the profession, which required financing on the part of the Society, is the new Engineering Index. While this activity is, of course, under the supervision of the Committee on Publications, yet the Finance Committee has assumed a real responsibility in the preliminary analysis of the problem and in financing the initial market surveys. The New York members of the Finance Committee in particular have been cooperating to a considerable degree with the Publications Committee and the Staff at headquarters to develop successfully this major undertaking of the Society.

Here again it should be noted that only the sound financial position of our Society, with its liquid reserves, renders this important undertaking possible. The funds advanced to the Publications Committee for this new development are loaned at 5 per cent, and to date $4200.00 have been advanced for this work. It is estimated that the maximum amount of financing that will be required, until this undertaking is on a complete self-supporting basis, is from $35,000.00 to $40,000.00.

Conclusion. In conclusion, your Committee desires to point out the desirability of maintaining our present financial policies, for these policies

have enabled the Society to reach a solid financial footing and permit it, by reason of its ability to finance, to undertake worth-while projects that are a distinct contribution which a few years ago would have been impossible.

Wm. J. Struss & Co., certified public accountants, give the results of their examination of the books of the Society for the fiscal year ended September 30, 1927, in the following statement of assets and liabilities.

Balance Sheet as of September 30, 1927

Assets

Cash		$5,284.50
Accounts Receivable:		
Members	$22,144.14	
Non-Members	114,946.40	
		137,090.54
Inventories:		
Supplies	$23,913.56	
Publications in process	7,727.35	
Publications for sale	17,650.46	
		49,291.37
Temporary Investment:		
Lawyers Mortgage Bonds 5½%	$3,000.00	
Savings Banks	399.69	
		3,399.69
TOTAL		$195,066.10
Investments for Trust Funds (see contra) :		
Lawyers Mortgage Bonds 5½%	$61,500.00	
St. Louis, Peoria and N. W. R. R. 5%	10,613.89	
New York Central, Hudson River R. R. 4%	23,062.50	
S. W. Strauss & Co. mortgage bonds	9,000.00	
J. R. Freeman—Stock Shares	25,231.33	
Cash in banks	1,828.35	
		131,236.07
Investments for Capital Account (see contra) :		
Lawyers Mortgage Bonds 5½%	$167,000.00	
Lake Shore and Mich. So. Ry. 4%	44,521.88	
S. W. Strauss & Co. mortgage bonds 5¾%	50,000.00	
Alabama Pr. & Lt. Co. 5%	5,000.00	
Texas Pr. & Lt. Co. 5%	4,850.00	
Dallas Pr. & Lt. Co. 5%	5,000.00	
San Diego Cons. G. & E. 5%	5,075.00	
Binghamton. L. H. P. 5%	5,000.00	
Commonwealth Edison 5%	5,118.75	
Metropolitan Edison 5%	5,012.50	
Public Service of Ill. 5%	4,962.50	
Cumberland P. & L. 4½%	4,725.00	
Baltimore & Ohio R. R. 5%	5,115.00	
Baltimore & Ohio R. R. 4½%	4,947.50	
		316,328.13
Fixed Assets (Book values) :		
Building and Equipment	$506,116.62	
Library Books	1.00	
Engineering Index	1.00	
		506,118.62
Engineering Index Service Advances		1,410.93
Deferred Charges:		
Office rearrangement	$15,323.49	
Activities, 1927-1928	7,482.81	
		22,806.30
TOTAL ASSETS		$1,172,966.15

Liabilities

Unfilled Obligations		$36,183.41
Accounts Payable		14.475.76
Research Custodian Funds:		
Lubrication	$307.77	
Elevator Safeties	16,443.36	
Gear	498.19	
Standardization Bolts, Nuts, Rivets	840.14	
Fluid Meter	1,699.00	
Steam Table	621.87	
Mechanical Springs	5,455.39	
Oil Power National Conference	189.96	
Boiler Refractories	4,248.98	
Substitutes for Domestic Woods	80.74	
Spark Arrester	100.00	
Cutting and Forming of Metals	337.40	
Welded Pressure Vessels	23.60	
Bearing Metals	45.63	
Condenser Tubes	16.55	
Properties of Metals	490.91	
Airplane Dynamics	250.00	
Textile	200.00	
Saws and Knives	200.00	
		32,049.49
Trust Funds (see contra):		
Life Membership	$52,069.57	
Library Development	5,735.44	
Weeks Legacy	2,289.40	
Melville	1,556.47	
Chas. T. Main	2,908.61	
Hunt Memorial	297.45	
Hess Prizes—Juniors and Students	2,000.00	
A.S.M.E. Research	550.12	
Westinghouse Bust	169.72	
Holley Medal	6,532.84	
Max Toltz	15.087.50	
John R. Freeman	24,463.32	
Lincoln Arc Welding Prize	17,575.63	
		131,236.07
Dues Paid in Advance		2,205.84
Capital Investment:		
In Fixed Assets (see contra)		506,118.62
Capital Investments (see contra)		316,328.13
Reserve for Retirement Allowance		5,000.00
Working Capital		129,368.83
TOTAL LIABILITIES		$1,172,966.15

Approved by WM. J. STRAUSS & CO., *Auditors*, 10/20/27.

Contributions of the A.S.M.E. to Joint Activities

Joint activities	Fiscal year ending	Contributed by A.S.M.E. during fiscal year ending 9/30/1927	Contributed by other engineering societies	Other income
American Engineering Council	Dec. 31	$17,521.52	$24,500.00	$5,000.00
Library	"	8,316.17	29,400.00	22,500.00
Employment Service	"	4,130.00	3,870.00	33,592.00
S.P.E.E. — Investigation of	"	1,200.00	4,650.00	39,100.00
A.E.S.C.	"	1,500.00	9,000.00	50,700.00
Inter. Elec. Com. U. S. Nat'l Committee	Sept. 30	500.00	1,250.00	1,700.00
TOTAL		$33,167.69	$72,670.00	$152,592.00

Condensed Comparison of Balance Sheets

	Sept. 30, 1926	Sept. 30, 1927	Net change during the fiscal year
Assets			
Cash	$40,510.66	$8,684.19	— $31,826.47
Accts. Receivable	127,322.41	137,090.54	+ 9,768.13
Inventory	46,700.44	49,291.37	+ 2,590.93
Deferred Charges	11,971.70	24,217.23	+ 12,245.53
Investments for Trust Funds	87,556.68	131,236.07	+ 43,679.39
Investments for Capital Account	226,521.88	316,328.13	+ 89,806.25
Fixed Assets	502,823.96	506,118.62	+ 3,294.66
TOTAL ASSETS	$1,043,407.73	$1,172,966.15	+$129,558.42
Liabilities			
Unfilled Obligations	$31,039.82	$50,659.17	+ $19,619.35
Contributions for Research	30,067.49	32,049.49	+ 1,982.00
Dues Paid in Advance	2,592.04	2,205.84	— 386.20
Trust Funds	87,556.68	131,236.07	+ 43,679.39
Capital	892,151.70	956,815.58	+ 64,663.88
TOTAL LIABILITIES	$1,043,407.73	$1,172,966.15	+$129,558.42

Condensed Statement of Income and Expenditures

	1925-26	1926-27
Income		
Initiation Fees	$26,846.32	$29,443.69
Membership Dues	279,806.57	284,978.13
A/c Rec. Members and Non-members	363,740.63	394,824.34
Interest	13,868.24	18,372.25
TOTAL INCOME	$684,261.76	$727,618.41
Expenditures		
Administration and General	$95,560.23	$101,829.15
Initiation Fees Account	20,385.61	21,917.10
Service to Members	237,945.12	258,280.24
Income Producing and Professional Account	235,140.64	260,060.11
Service to Public Account	24,327.45	22,701.86
	$613,359.05	$664,788.46
Plus Preceding Year's Over-expenditure on Condensed Catalogues	2,295.35	614.47
	$615,654.40	$665,402.93
BALANCE OF INCOME OVER EXPENDITURES	$68,607.36	$62,215.48

Meetings and Program

During 1926-1927, in addition to the regular Annual Meeting and the Spring Meeting, two regional meetings were held, one at Kansas City, Mo., April 4 to 6, 1927, and the other at Seattle, Wash., August 29 to 31. At these four meetings, about 131 papers and about 26 reports were presented at 42 sessions (Annual Meeting 22 sessions, 75 papers, 25 reports; Kansas City, 7 sessions, 19 papers; White Sulphur Springs, 11 sessions, 26 papers, 1 report; Seattle, 2 sessions, 11 papers).

A registration of 2213 at the Annual Meeting, December 6 to 9, 1926, marked this as the largest meeting ever held by the Society. The program was notable for its size and variety. One of the outstanding ceremonies at

this meeting was the award of the John Fritz Medal to Dr. Elmer Ambrose Sperry "for the development of the gyro compass and application of the gyroscope to the stabilization of ships and airplanes." At this meeting were presented also the second Robert Henry Thurston and Henry Robinson Towne Lectures. The Robert Henry Thurston Lecturer for 1926 was Dr. Cecil Howard Lander, Director of Fuels Research, Department of Scientific and Industrial Research, London, England, who spoke upon Recent Discoveries in the Science of Coal Utilization. The Henry Robinson Towne Lecture was delivered by Dr. Davis Rich Dewey, Department of Economics, Massachusetts Institute of Technology, who spoke on the Credit Factor in the Structure of Industry.

The local committees in charge of the Kansas City regional meeting were responsible for the well-balanced program of both technical and entertainment events carried out without a hitch. Interesting and instructive sessions were arranged, which were followed by tours of inspection.

The Spring Meeting at White Sulphur Springs, W. Va., May 23-26, 1927, the first to be held at a resort since 1910, proved to be a success and satisfactory to all who attended. Members from practically every state east of the Mississippi and many of the far-western states were in attendance. One of the important features of the banquet at this meeting was the presentation of the A.S.M.E. Medal to Wilfred Lewis for his work on gear teeth. The principal speaker of that evening was Loughnan Pendred, editor of the British publication, *The Engineer*.

The Seattle meeting, with two sessions at which 11 papers on diversified subjects were presented, was a successful one with an unusually interesting entertainment program.

The Committee has under way plans for the Fiftieth Anniversary Celebration in 1930. It is planned to make this international in character and the Committee believes this offers a splendid opportunity for the advancement of the engineering profession. Formal approval has been given for holding the Spring Meeting in 1930 in Washington, D. C., in the month of April, making this part of the 50th anniversary celebration.

The whole-hearted cooperation of the Professional Divisions has made possible the adoption of the policy that manuscripts of papers to be presented before the Society must be in hand two months before the meeting or the paper cannot appear on the program. This policy, while in partial effect before, has been made a rigid one in the planning of the program for the coming Annual Meeting.

Publications

The outstanding achievement of the Committee on Publications for the fiscal year 1926-27 is the formulation of an entirely new procedure for issuing the publications of the Society. This procedure, developed with the cooperation of the Committee on Professional Divisions and with the support of the individual Professional Divisions, promises an increase in the amount of published material and an improvement in the service to the individual member. A second important step is the plan for the expansion of the Engineering Index into a weekly card index system.

Another title has been added to the list of biographies published by the Society — the "Life of Walter V. Kerr," written by Dean A. W. Smith and published at the expense of H. H. Westinghouse. Dr. Wm. F. Durand, Past-President, has also started work on the biography of Robert H. Thurston.

During this current fiscal year the volume of publications made a still further increase over preceding years. The following tables of pages are of interest:

	1923	1924	1925	1926
Mechanical Engineering	730	938	1190	1504
Transactions	946	1370	1402	1493

The publication of the A.S.M.E. News, the 1927 Year Book, the 1926 Engineering Index Annual, and the Condensed Catalogues was conducted in the usual successful manner. The total advertising pages in the publications have increased approximately 10 per cent during the year.

Membership

The Committee on Membership held twenty meetings during the year 1926-1927.

The number of applications considered in the transaction of its work and a summary showing the action taken are as follows:

Applications pending October 1, 1926	665
Applications received during fiscal year 1926-1927	2062
Total applications handled during year 1926-1927	2727
Recommended for membership	2259
Transfers denied	10
Deferred	34
Withdrawn	7
Applications pending October 1, 1927	417
Total applications handled during year 1926-1927	2727

Those recommended for membership were graded as follows:

Members		437
Transfers to Member		132
Associates		50
Transfers to Associate		1
Associate-Members		331
Transfers to Associate-Member		133
Juniors		573
Juniors (R 5 Rule 1)		602
Total		2259
Elections declared void	60	
Resignations accepted	352	
Dropped from membership	647	
Deceased	129	
Applications approved		2259
Transfers		266
Total new members		1993
Resignations, dropped, deceased and elections void		1188
* Net Gain in Members		805

* This is not the actual gain of the Society's membership but represents those recommended for admission by the Membership Committee.

Professional Divisions

The Standing Committee on Professional Divisions reports wholesome progress for the year of 1927. A statement of activities is appended. We draw some conclusions as to the value of these and discuss possible ways of developing them.

Four phases of activity were selected, as follows:

1 National Division Meetings
2 Sessions at Society Meetings
3 Annual Progress Reports
4 Surveying for Research

The attached tabulation shows the progress made possible by the wholehearted cooperation of our own members and the friendly support of other societies, groups, corporations, and individuals.

The plan of having a National Meeting for each Division has found its place in the scheme of Society activities. During the year eight National Division Meetings were held. They elicited wholehearted support from the Local Sections where they were held, and aided in stimulating greater interest in engineering in those localities. Their value to the Society is shown by the fact that about 40 per cent of those attending were guests, and many were for the first time in close contact with the Society's purpose in engineering.

The Society must be alert to the increasing trade and professional associations, and the time and energy of our members must be conserved. Corporations readily send their engineers and executives to their trade organizations' meetings, but some are still not inclined to send their men to attend meetings of professional societies. It is wise, therefore, to hold our National Division Meetings at the times and places most convenient for our members to attend. In some cases this may coincide with some trade exposition or organization meeting. There is a tendency for trade organizations to form technical departments and to cooperate with professional engineering societies in bringing before their own members technical and management problems. Our own Society is in excellent position to cooperate in such a way through the Divisions and their National Meetings.

The technical programs for the Annual, Spring and Regional Meetings contain a large number of valuable papers contributed by the Professional Divisions. In planning for the Annual Meetings the Professional Divisions are supporting the Committee on Meetings and Program in its policy of securing manuscripts at least two months in advance of the meeting, so that papers may be reviewed and helpful discussion secured.

The progress reports of the Professional Divisions, which will form an important part of the Annual Meeting program, have been prepared from information supplied by many individuals and corporations.

A procedure has been developed for coordinating the work of the Standing Committee on Research and the individual Professional Divisions. Each Division has appointed a Committee to survey its field and suggest subjects for research programs. Sixteen such projects have been placed before the Standing Committee on Research for consideration.

The formulation of the new policy for conduct of the Society publications has been a great help in the development of the Professional Divisions as it associates membership in the Society directly with membership in the Divisions. This will enable the Divisions better to set up their programs and carry on their work to satisfy the needs of a definite audience.

The Professional Divisions feel that the four-point program has been a success during the past year. During the coming year it will be continued.

Professional Divisions Activities in 1927

Four Point Program

	Aeronautic	Fuels	Hydraulic	Iron & Steel	Machine Shop Practice	Management	Materials Handling	National Defense	Oil & Gas Power	Petroleum	Power	Printing Machinery	Railroad	Textile	Wood Industries	Total 1927	Total 1926
1. *Sessions at Society Meetings.* (Spring, Regional, Annual).																	
a. Number of Sessions	1	3	2	0	4	4	2	..	1	1	5	0	3	0	1	27	39
b. Number of Papers	3	6	6	..	13	9	4	..	7	2	13	0	7	0	2	72	108
2. *National Division Meetings*	1	1	0	1	1	1	0	1	0	0	(a)	1	0	0	1	9	1
a. Number of Sessions	3	10	..	1	5	5	..	1	..	..	2	1	..	..	3	31	2
b. Number of Papers and Addresses.	7	24	..	2	10	14	..	1	..	..	3	2	..	..	8	71	5
c. Attendance — Members	60	350	..	310	125	77	..	704	..	..	148	60	..	..	66	1,900	60
d. Attendance — Non-Members	86	350	..	504	175	127	..	292	..	..	54	110	..	..	86	1,784	42
e. Attendance — Total	146	700	..	814	300	204	..	996	..	..	202	170	..	..	152	3,684	102
1 & 2.																	
a. Total Division Sessions Held	4	13	2	1	9	9	2	1	1	1	7	1	3	0	4	58	41
b. Total Division Papers Presented	10	30	6	2	23	23	4	1	7	2	16	2	7	0	10	143	113
3. *Research.*																	
a. Survey Committee at Work	..	1	1	..	1	1	1	..	1	1	..	..	1	1	..	9	4
b. Executive Committee Acting as Survey	1	..	..	..	..	..	..	1	..	..	1	1	..	..	1	5	2
c. Number of Projects Suggested	2	5	1	..	1	6	0	1	0	0	1	0	0	3	0	20	3
d. Number of Special Committees at Work	1	1	..	..	..	1	..	..	..	..	..	..	..	1	3	7	3
4. *Progress Reports*	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	13	12
5. *Enrollment in Divisions—1927*(g)	1241	2716	1219	1318	2783	4133	1750	(f)	1980	784	4264	165	823	374	447	26,282	
6. *Enrollment in Divisions — 1926*	151	307	156	(h)	836	729	356	646	266	291	1545	53	478	307	164	6,285	

Reference Notes: (a) Erie Regional Meeting.
(f) All members of the Society are now enrolled in National Defense Division.
(g) Applied Mechanics Division just being organized. Enrollment 2200.
(h) Organized in 1927.

Local Sections

The year 1926-1927 has in many respects been an eventful one for the Local Sections of the Society. During the year Dayton, the sixty-eighth Section to be established, was organized in time to enable it to be represented at the Annual Meeting. Three hundred and forty-five meetings were held.

The development of cooperation between the Professional Divisions and Local Sections was quite marked, and the Sections uniformly responded in a very able manner to the suggestion that they develop individually their membership along professional lines.

During the year national divisional meetings were held for the first time at Chicago on Wood Industries; Buffalo, Aviation; New Haven, Machine Shop Practice; West Point, National Defense; New York, Printing Machinery. In addition to these, regional meetings were held at Kansas City, Mo., and Seattle, Wash.

Student Branch relationship likewise gained impetus, and to a greater extent than ever before the Local Sections took cognizance of the Student Branches operating within their territory. Not only were Student Branches encouraged through invitations to attend meetings of the Local Sections, but several outstanding meetings were held which were developed entirely to attract student interest. These included a joint meeting of the Metropolitan Student Branches with the Metropolitan Section with attendance of nine Student Branches and a program which covered a morning inspection trip and evening technical sessions with dinner intervening. A number of the Local Sections arranged for debates between Student Branches within their territory, these being conducted at Denver, Indianapolis, and Philadelphia.

The New Haven Section sponsored for the seventh consecutive year a successful Machine Tool Exhibition held in conjunction with the engineering faculty of Yale University and the New Haven Chamber of Commerce. Coincident with the exhibition, a series of technical sessions were held constituting a national divisional meeting of the Professional Division on Machine Shop Practice.

As a direct result of the New Haven Exhibition, a start was made toward cooperative measures between two thousand New England members of the Society and the New England Council, which may result in constituting these members as part of an Engineering Division of the New England Council, the purpose of which is to foster New England industry. It is believed that this is the first time the Society has been able officially to attract the interest of an organization covering an entire section of the country devoted to the improvement of general economic conditions.

At the Annual and Spring Meetings and also at the New Haven Meeting, conferences of Local Sections' Delegates were held. The only one of these which was formal and entitled the delegates to traveling expenses was held at the Annual Meeting, when representatives of all sixty-eight Sections were present. The last Local Sections Conference was probably the best organized and attended conference that was ever held.

At the Local Sections' Delegates Conference held at the Spring Meeting, White Sulphur Springs, May, 1927, a precedent was established whereby the topics for discussion at the Annual Meeting were discussed and arranged. It is the expectation of the Committee that this precedent will in the future he followed, because in that way the sections will have a direct part in the shaping of the program for the formal conference held during each Annual Meeting.

The Committee on Local Sections, which also serves the Society as the Committee on Society Development, was responsible during the year for reprinting the attractive brochure descriptive of the Society's activities and available for distribution to members or persons interested in having such a statement, and also the manual for the operation of a Local Section. These publications were developed with a view to extending the usefulness of the Society both to the existing membership and to those members of the profession who have not heretofore appreciated the opportunities which it affords for improving their own status, as well as that of the profession.

The Committee during the year made a definite effort to develop all existing Local Sections to a state of efficiency, rather than to extend the number of Local Sections. Members were encouraged also to take the initiative in forming new sections. In accomplishing this purpose, the Committee held two field meetings, one at Dallas, Texas, and one at Detroit, Michigan. Thirty-seven Local Sections were visited, either en route to its regular meetings or when necessary by special travel, by members of the Committee or its secretary. A complete list of these places is available in the files of the Society.

Constitution and By-Laws

The Committee on Constitution and By-Laws acts as a reviewing committee and advisor to the Council in preparing the wording of revisions of the Constitution, By-Laws and Rules to carry out approved policies. Since the completion of the general revision of the Constitution and By-Laws a few years ago, the work required has been limited.

Notable this year are the revisions of the By-Laws on Professional Divisions covered in detail in Article B10, paragraph 2; and revisions of Article B12, paragraphs 2, 3, 4, 7, and 8, to take care of the changes necessary under the new publications policy.

In response to the requests of the Council this committee, acting jointly with the Committee on Relations with Colleges, presented suggested amendments that would clear up the ambiguity that existed in the By-Laws and Rules with relation to the Student Associate membership requirements and Student Branches. This was cared for through slight revisions and additions under R11, rules 24, 25, 35 and new rules 38, 39 and 40; also under R12, rule 1, and provision was made to change the statements in the Record and Index to care for awards for Student Associates and enrolled students.

The complete details of these changes as finally approved appear in the minutes of the Council of April 4 and October 8, 1927.

Awards

The Committee on Awards held several meetings during the year in addition to its other activities including the reading of a large number of papers submitted for the several Society awards. An additional activity which engaged its attention this year was the preparation of the rules under which the Lincoln Arc Welding Prize Contest was to be administered.[1]

Upon the recommendation of the Committee on Awards, the Council reported the following awards for 1927:

[1] These rules were published in the February 22, 1927, issue of the *A.S.M.E. News.*

A.S.M.E. Medal to Wilfred Lewis for his contribution to the design and construction of gear teeth.

Student Awards to Alfred H. Marshall of Princeton University for his paper on "Evaporative Cooling"; and to Roger Irwin Eby of the University of Washington for his paper on "Measurement of the Angular Displacement of Flywheels."

Charles T. Main Award. The Committee felt that none of the papers submitted were worthy of consideration and, on the recommendation of the Committee, Council voted that the subject for the award be resubmitted as "Scientific Management and Its Effect on Manufacturing."

Melville Medal. For the first time, the Melville Medal was awarded to L. P. Alford for his paper on "Laws of Manufacturing Management."

Junior Award, 1927. William M. Frame, Sharon, Pa., for his paper. "Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressures."

In connection with the Major Max Toltz Loan Fund, the Committee has been able to help seven students with loans amounting to $1,250.00.

Upon the completion of the term of James H. Herron in December, 1926, Professor H. L. Seward was appointed for a five-year term ending in 1931.

Relations with Colleges

During the year the Committee on Relations with Colleges held four meetings and in addition members of the Committee visited a considerable number of the 92 established Student Branches of the Society. These 92 branches have reported holding 420 meetings. In addition to this there have been several joint meetings of Student Branches with Local Sections and in Philadelphia and New York meetings of the several Student Branches in the territory in conjunction with the Local Section. There has been an increased interest in the series of debates between various Student Branches arranged by Local Sections in different parts of the country. Some of the Local Sections have appointed committees of their members to develop interest in the activities of the Student Branch or Branches in their territory. At the national meetings of the Society, members of the Student Branches have assisted in the conducting of the registration headquarters and otherwise whenever there was a branch in the city where the meeting was held.

At the Annual Meeting of the Society, the conference of Student Branch delegates was held and in addition the students attended a luncheon at which President Schwab and other members of Council were present.

During the year 573 members of Student Branches applied for Junior Membership. These were men who had been graduated within a year of the time they made application for membership.

The Committee has issued a revision of the Student Branch brochure dealing with Student Branch activities and outlining the form of organization and relationship between the Branches and the Society. The committee also has issued monthly to the officers of the branches a bulletin in which news of current interest and suggestions for organizing meetings, motion picture films available, etc., have been given.

During the year, Professor E. F. Church, Jr., and M. C. Maxwell were added to the personnel of the committee and have contributed materially to its deliberations.

The committee wishes to express its appreciation for the helpful cooperation of members of the Society who have been willing to visit Student

Branches and address them and also to those members of the Society and the various engineering faculties who have given such helpful service as Honorary Chairmen.

Education and Training for the Industries

Following is the report for the year ending October 1, 1927.

Meetings of the Committee on Education and Training for the Industries were held in New York in December, 1926, and at White Sulphur Springs in May, 1927. There is an active correspondence, however, which all members of the committee share. These meetings and some of the correspondence resulted in the suggestion for an investigation of education and training for the industries, made to the Council in a letter of December 10, 1926, which is already in the files, and amplified in a letter to Council under date of May 23, 1927, also in your files. Council's reception of the May 23 letter was encouraging, and the Committee is now getting additional information, so as to be able to make a report to Council, outlining more specifically the purpose and the cost of the investigation.

The Committee arranged, or was largely instrumental in arranging, the following sessions on Education and Training for the Industries. The papers starred have appeared in *Mechanical Engineering*.

Annual Meeting, New York, December, 1926.

Chairman: Dean R. L. Sackett, School of Engineering, Pennsylvania State College.

*Educational Training for Industry, by Matthew Woll, Vice-President, American Federation of Labor.

*Trades Training, by C. S. Coler, Manager, Educational Department, Westinghouse Electric and Manufacturing Company.

Regional Meeting, Kansas City, April, 1927.

Chairman: Professor W. T. Magruder, Ohio State University.

*Railway Apprenticeship in a National Apprenticeship Plan, by F. W. Thomas, Director of Apprentices, Atchison, Topeka & Santa Fe Railway Company.

*Industrial Problems or Difficulties—A True Basis for the Development of Foremen, by L. A. Hartley, Director of Education, National Founders Association.

*Education for the Industries, by P. F. Walker, Dean, School of Engineering, University of Kansas.

Spring Meeting, White Sulphur Springs, May, 1927.

Chairman: John T. Faig, President, Ohio Mechanics Institute.

*The General Motors Institute of Technology, by Albert Sobey, Director, General Motors Institute of Technology.

*A Description of the Henry Ford Trade School, by F. E. Searle, Superintendent, Ford Trade School.

*A Uniform Apprenticeship Certificate for Cooperating Groups of Employers, by Wm. S. Conant, Consulting Engineer.

National Meeting of the Machine Shop Practice Division, New Haven September, 1927.

Chairman: Luther D. Burlingame, Industrial Superintendent, Brown & Sharpe Manufacturing Company.

Education for Foremanship, by James A. Moyer, Director, Massachusetts University Extension.

Improvement of Foremanship by the Conference Method, by C. F. Klinefelter, Federal Board for Vocational Education.

The Committee has arranged a program for the Annual Meeting in New York, December 5-8, 1927.

Library

Engineering Societies Library has been increasingly active during the past year. More readers have attended, more photo-prints have been distributed, more time spent in searching, and more books have been lent for use outside the Library. There has also been a noticeable increase in the correspondence with members at a distance. The Library has been used by members in almost every state, as well as by many residents in other countries.

The collection contains 115,000 items, all fully classified and cataloged, and additions are made daily. Over twelve hundred periodicals are received currently. These supply the source material for the Engineering Index, as well as the permanent reference collection of the Library.

The budget for 1927 is $60,694, of which $33,250 is provided by the four Founder Societies in equal shares, $15,294 will be earned by the Service Bureau, and the remainder provided by the United Engineering Society from endowments and other sources.

The endowment was increased during the year by the gift of fifty thousand dollars by Edward Dean Adams, Vice-Chairman of the Library Committee.

A report on the Library will be published at the end of its fiscal year, December 31, and will be sent to any member on request.

Research

Summary of Progress. The past year has been a very active one for research in the Society and clearly reflects the growing appreciation in industry of the value of research. Little could be done by the Society in this field with its own small research budget were it not for the cooperative support that industry has given its program in growing measure during the past few years.

The main research committee in its capacity of supervising the conduct of Society research activities has held five meetings during the year. Seven new special and joint research committees have been authorized by the Council, namely, the Joint Committee on Determination of Physical Constants of Refrigerants, the Special Committees on Cutting Edges (Thin Metal Plates), Airplane Dynamics, Strength of Cylindrical Vessels under Pressure, Absorption of Radiant Heat in Boiler Furnaces, Fuels, and Velocity Measurement of Fluid Flow. This makes a total of twenty-four research committees now sponsored by the Society, all but five of which are organized and actively prosecuting their programs. Of these five, four are in process of organization and one is inactive. Some dozen research projects suggested by the Survey Committees of the Professional Divisions are in the process of development. During the year five of the special and joint committees have carried on financial campaigns for the support of their projects and have raised a total of $45,000.

A varied and extensive research publications program has been carried on during the year. Over one hundred pages of material representing

research results of special committee investigations, reports of progress, and other material of general publicity nature have appeared in *Mechanical Engineering* alone and several other committee reports have appeared in the form of papers in other journals. Complete bibliographies on Mechanical Springs and Woods of the World with Emphasis on Tropical Woods have been published by two of the special research committees. Part 1 of the Report on Fluid Meters has also been revised by that committee and the second edition published.

Believing that the Society members generally should have a better knowledge and appreciation of the work of the Society's research activities, the main research committee through its staff has been supplying news items regularly to the semi-monthly issues of the *A.S.M.E. News* on the work of its Special and Joint Research Committees.

In an effort to carry this idea further the main committee has prepared a research booklet which is to be given wide circulation among engineers and industrialists in the country. This booklet is designed to give a concise explanation of A.S.M.E. research methods, a record of accomplishments of the research committees, and useful information on committee organization and procedure based on the twenty years' experience that the main committee has had in conducting this kind of work. It is expected that this booklet will be of particular value to special research committees in their campaigns for funds to support their programs.

During the past year the main research committee has been giving much attention to the development of a new research program for the Society. It has been prompted to do this by a realization that the financial limitations of the Society preclude much further extension of research activities along present lines. This new program is soon to be announced.

Organization, Procedure and Facts of Interest. Since 1919-1920 approximately $35,000 has been expended by the main research committee in the development and organization of special and joint research committees and in other research activities. The success of these methods is attested to by the fact that in that time $152,000 in addition has been raised by industry through the efforts of these committees for the support of their work, a ratio of over four dollars to one. This total sum has been raised by the several special and joint research committees as follows: Steam Tables, $64,600; Elevators, $35,000; Boiler Furnace Refractories, $21,000; Mechanical Springs, $5,500; Strength of Gear Teeth, $6,600; Lubrication, $1,650; Fluid Meters, $1,900; and pledges of $15,000 have been received by the Joint Research Committee on Welding of Pressure Vessels for its program.

The present status of A.S.M.E. research activities is clearly stated in the following brief facts:

Main research committee budget for 1926-1927	$14,000
Authorized special and joint research committees organized by main research committee	24
Research projects in process of development	12
Total membership of special and joint research committees	290
Number of men spending full or part time on actual research for these committees	70

Researches in progress at:

5 Government Laboratories	8 University Laboratories
20 Industrial Laboratories	4 Field Investigations

Research publications since 1919-1920	75

Amount expended by main research committee in exercising its functions $35,000
Total funds raised by special and joint research committees for support of their activities..... $152,000

In evaluating the method of research organization outlined in the preceding paragraphs it should be borne in mind that undoubtedly its successful operation has depended largely on its sponsorship by a well-known and respected national organization like The American Society of Mechanical Engineers. Such a society, unaffected by commercial considerations or influence and made up of technical men interested primarily in the advancement of knowledge of mechanical engineering and of their profession, serves as the ideal means of promoting cooperative research. The progress of its various special and joint research committees furnishes a fine example of the confidence which industry has placed in the unbiased and high-minded character of the Society. A review of the activities of these committees during the past year follows:

Lubrication. This special research committee on Lubrication was authorized in October, 1915, to investigate underlying scientific laws and to formulate results of investigations previously made.

During the year the committee has completed its experimental work under the direction of Dr. Mayo D Hersey at the U. S. Bureau of Mines and the Carnegie Institute, Pittsburgh, Pa., on mine car bearing friction losses and viscosity of lubricating oils under both high pressures and temperatures. At the symposium on research at the coming Annual Meeting reports will be presented by Dr. Mayo D. Hersey and his associates on the results of this experimental work. These reports are listed below.

A few months ago the Committee began experimental work at the Bureau of Standards, Washington, D. C., in an effort to establish a practical relation between design and journal bearing lubrication.

Publications (1926-1927). To be presented at the Lubrication Symposium, 1927 Annual Meeting:
Progress Report No. 4—Summary of past five years' work.
Viscosity of Lubricants under Pressure, by Mayo D. Hersey and H. Shore.
The Effect of Running In on Journal-Bearing Performance, by S. A. McKee.

Fluid Meters. R. J. S. Pigott, chairman. This committee was authorized in 1916 to develop the theory of fluid meters of all kinds and to report on the best methods of their application.

The revision of Part 1 of the Committee's report on Fluid Meters has been completed during the past year and the second edition is now in the printer's hands. Sub-committees are working on several other phases of the committee's program including the preparation of Part 2 of the Report on Fluid Meters dealing with the Description of Meters and the Influence of Installation.

Publications (1926-1927).
Report on Fluid Meters, Their Theory and Application, Part 1, Second Edition.

Properties of Steam and Extension of Steam Tables. George A. Orrok, chairman. This Committee was authorized in December, 1921, to direct the researches on this subject then going on at Harvard University, Massachusetts Institute of Technology, and the Bureau of Standards, and to administer the fund contributed by industry for this purpose. The purpose of these separately conducted investigations is to collect accurate and conclusive data on the characteristics of steam from which a standard form

of steam table may be prepared covering the entire range of steam temperatures and pressures likely to be of practical use. The sixth annual session on the progress of the committee's work is to be held at the time of the coming Annual Meeting of the Society. The executive committee on the Steam Table Fund reports that $64,028.44 has been expended to date on this research.

Publications (1926-1927).

Progress in Steam Research, February, 1927, issue *Mechanical Engineering.*

Report of the Executive Committee of the Steam Table Fund.

Report on Progress in Steam Research at the Massachusetts Institute of Technology, by L. B. Smith.

Report on Progress in Steam Research at the Bureau of Standards, by E. S. Mueller.

Work on Pressure Standard at Massachusetts Institute of Technology, by F. G. Keyes.

Comparison with Formulations, by R. C. H. Heck.

In the same issue appeared an article on the Recent Experiments on the Properties of Steam at High Pressures, by Prof. H. L. Callendar, which was an abstract of the concluding lecture of a series delivered by Professor Callendar at the Royal Society of Arts, London.

Strength of Gear Teeth. Wilfred Lewis, chairman. This special committee was authorized in December, 1921, to conduct tests for the determination of the effect of varying degrees of tooth accuracy and varying velocities on the strength of gear teeth.

Extensive experimental and analytical work has been carried on during the year for the committee by Prof. Earle Buckingham with the Lewis Gear Testing Machine at the Massachusetts Institute of Technology. In a series of nine progress reports which have appeared from time to time during the past year in *Mechanical Engineering,* Professor Buckingham has developed a method of analyzing experimental data already obtained by the committee covering the influence of error and elasticity on the strength of gear teeth. As a result of this work the committee hopes to publish soon practical design data on gears.

The services of Professor Buckingham have been donated to the committee by the Massachusetts Institute of Technology and a large group of manufacturers both here and abroad have generously contributed test gears and gear materials for the experimental work.

Publications (1926-1927).

The following progress reports on the Influence of Elasticity on Gear Tooth Loads will be found in *Mechanical Engineering*:

Report No. 4—Perfect Gears—June, 1927, issue.

No. 5—Influence of Errors on Acceleration Loads—July, 1927, issue.

No. 6—Impact Loads—August, 1927, issue.

No. 7—Influence of Rotating Masses—November, 1927, issue.

No. 8—Test Runs with Hardened and Ground Steel Gears—December, 1927, issue.

Cutting and Forming of Metals. Professor James A. Hall, chairman. This special committee was authorized in September, 1923, to investigate and report on the needs of the machine-tool industry in the matter of improved design and to correlate the activities of the various organizations, firms, and individuals which are now at work in this field.

As a result of a survey of the need in the field of cutting and forming of metals the committee has decided to undertake immediately investigational work on cutting fluids. A subcommittee has been appointed under the chairmanship of Mayo D. Hersey which will carry on research work at the Bureau of Standards in an attempt to establish a relation between cutting performance and the physical and chemical properties of cutting fluids, and result in the establishment of specifications for purchasing cutting oils. At its meeting in Cleveland, Ohio, on September 20, 1927, during the National Machine Tool Builders Exposition, the committee voted to begin at once a campaign for funds to cover the cost of three parts of its program: (a) bibliographical research of the published material relating to cutting metals and its reduction to usable form, (b) study of lubricating oils and coolants, and (c) the development of a satisfactory measure and standards for machineability.

Publications (1926-1927).

A Research in the Elements of Metal Cutting, by Orlan W. Boston, presented at the Annual Meeting of the A.S.M.E. in N. Y., December, 1926; also published in the February, 1927, *Mechanical Engineering*.

Rough Turning with Particular Reference to the Steel Cut, by H. J. French and T. G. Digges. Presented at the Annual Meeting, December, 1926.

Work-Hardening Properties of Metals, by E. G. Herbert. Presented at the Annual Meeting, December, 1926.

Mechanical Springs. Joseph Kaye Wood, chairman. This special committee was authorized in December, 1923, to determine the present status of the metal-spring art, to promote and conduct necessary and adequate research, and to develop the art to the point of standardization.

The committee has successfully completed a campaign for funds to cover its investigational program for the first year. Two research workers have been appointed to carry on experiments at Union College, Schenectady, N. Y., leading to the development of a Code of Design of Mechanical Springs. An extensive bibliography on Mechanical Springs has been prepared by the committee and is now in the hands of the printer. Besides the bibliography material an up-to-date review of the mechanical spring art will be included in this publication.

Publications (1926-1927).

Hysteresis Relative to the Operation of Mechanical Springs, by J. K. Wood. Presented at White Sulphur Springs, May 26, 1927.

Effect of Temperature on the Properties of Metals. G. W. Saathoff, chairman. This committee was authorized in December, 1924, as a joint research committee with the American Society for Testing Materials to encourage investigation and accumulation of data in this field which will lead to standardization of the procedure of testing materials at high and low temperatures.

Three meetings of the committee have been held during the year, the first during the A.S.M.E. 1926 Annual Meeting, the second during the A.S.T.M. Group Committee Convention at Philadelphia, Pa., in March, 1927, and the third during the A.S.T.M. Annual Meeting at French Lick, Ind., in June, 1927.

Preliminary physical and chemical tests on various metals at high temperatures have been carried on throughout the past year for the committee by some thirty cooperating commercial and university laboratories and government bureaus scattered over the country. The purpose of these tests is to develop standard methods of testing procedure for

metals at high temperatures. Progress reports of this work were presented at the June, 1927, committee meeting at French Lick, Ind.

The complete testing program planned by the committee is very comprehensive and includes tensile, torsional, fatigue, and impact tests, chemical stability, determination of thermal and physical constants, etc. Five classes of metals are to be studied at high temperature by these methods and it is estimated that $50,000 per year will be required for the proper conduct of the work. A series of fatigue tests has already been begun at the University of Illinois under the direction of Dr. H. F. Moore. The committee is now planning a financial campaign for funds to support its program.

Publications (1926-1927).

Properties of Boiler Tubing at Elevated Temperatures Determined by Expansion Tests, by A. E. White and C. L. Clark. Presented at the Annual Meeting, December, 1926.

The following progress reports were presented at French Lick, Ind., June, 1927:

Effect of Temperature on Properties of Metals, published in the October, 1927, issue of *Mechanical Engineering*.

Results of Tests on Thermal Expansion of Four Classes of Steel, by N. L. Mochel. Published in the October, 1927, issue of *Mechanical Engineering*.

Comparative High-Temperature Tension Tests on a Carbon Steel and on a Chromium-Molybdenum Steel, by L. W. Spring, C. Upthegrove, and H. J. French. Published in the October, 1927, issue of *Mechanical Engineering*.

Condenser Tubes. Prof. Albert E. White, chairman. This committee was authorized in May, 1925, to report on the causes of failure of copper alloy tubes in heat interchange apparatus in which steam and water are handled. The committee is at present reviewing the results of a questionnaire, circulated to some 800 public service, industrial, and street railway companies during the year, to determine the causes of failure in condenser tubes in plants scattered throughout the country. Coordination has been effected between the activities of this committee and that of the subcommittee on Surface Condensers, Evaporators, and Deaerators of the joint research committee on Boiler Feedwater Studies.

A bibliography on Condenser Tubes prepared last year by the committee is at present being revised for publication.

Boiler Feedwater Studies. Sheppard T. Powell, chairman. This committee was organized in March, 1925, to study methods of analysis and treatment of boiler feedwater for stationary and railroad practice.

Six national societies are cooperating in the activities of this committee. In the beginning the committee confined itself to the determination of the various phases of the industrial water problem and a study of existing methods of treatment. Several large open meetings have been held by the committee for general discussion of the subject. Four groups of problems appear to the committee to require research most at this time, namely, (a) the corrosion of boilers and auxiliary equipment, (b) priming and foaming of boiler feedwater, (c) embrittlement of boiler steel, and (d) the determination of efficiency of evaporators and deaerators and of their function in reducing feedwater troubles. A financial campaign based on a five-year research program is about to be launched and will require the support of industry to the extent of several hundred thousand dollars.

Publications (1926-1927).

Report No. 1, Sub-committee No. 9—Bibliography, October, 1926.

Report No. 2, Sub-committee No. 9—Bibliography, November, 1926.

Report No. 3, Sub-committee No. 9—Bibliography, February, 1927.

Report No. 4, Sub-committee No. 9—Bibliography, March, 1927.

Sedimentation with and without Chemicals, Pressure and Gravity Filters, Deconcentrators, and Continuous Blowdown Apparatus, by R. C. Bardwell, December, 1926.

Standardization of Water Analysis, by Harold Farmer, chairman, Progress Report of Sub-committee No. 8.

Pretreatment of Boiler Feedwater, by Clarence R. Knowles, chairman. Published in Mid-November, 1926, issue of *Mechanical Engineering*. Progress Report of Sub-committee No. 2.

Present Knowledge of Foaming and Priming of Boiler Water with Suggestions for Research, by C. W. Foulk, Columbus, Ohio. Progress Report of Sub-committee No. 3, published in November, 1926, issue of *Mechanical Engineering*.

Embrittlement of Steel, by Prof. A. G. Christie, chairman; Progress Report of Sub-committee No. 6. Published in November, 1926, issue of *Mechanical Engineering*.

At the meeting of the American Water Works Association in Chicago, Ill., June, 1927, the committee held a session at which the following papers were presented:

Zeolite Water Treatment in a Large Central Heating Plant, by A. H. White, J. H. Walker, E. P. Partridge, and L. F. Collins.

Boiler Feedwater Treatment from a Manufacturer's Viewpoint, by J. B. Romer.

Priming and Foaming of Boiler Waters, by Prof. C. W. Foulk.

Treatment of Locomotive Feedwater from the Chemical Standpoint, by W. M. Barr and Mr. Savidge.

The Value of Boiler Water Treatment to the Mechanical Department, by J. F. Raps.

Water Treatment from the Standpoint of Railroad Efficiency, by E. M. Grime.

Priming and Foaming, by C. H. Koyl.

Boiler Furnace Refractories. Clarence F. Hirshfeld, chairman. This committee was authorized in June, 1925, to determine the principal factors governing the failure of refractories in various types of installations, to subject these factors to detailed experimental analysis, to undertake the formulation of suitability tests and, if necessary, to attempt to develop a suitable refractory to meet the needs of severe service.

The investigational program of this committee is being carried out through two correlated investigations, one in the field and one in the laboratory. During the past year three research workers have been spending full time in the study of refractories service conditions in some 35 large central stations throughout the country. The information thus obtained is applied by five ceramic engineers at the Ceramics Laboratories of the Bureau of Standards, Columbus, Ohio, and the University of Illinois to the formulation of specifications for use of existing types of refractories and the development of improved types to meet severe service conditions. To date $17,000 has been expended by the committee in this work.

Publications (1926-1927).

A Petrographic Study of Some Slags from Boiler Furnaces, by Samuel J. McDowell and H. C. Lee. Presented before the American Ceramic Society, February 15, 1927.

Refractories Service Conditions in a Furnace Burning Pittsburgh Coal on Underfed Stokers, by R. A. Sherman and W. E. Rice, Pittsburgh, Pa.; published in October, 1927, issue of *Mechanical Engineering*.

Service Factors Governing the Slagging of Boiler-Furnace Refractories, by R. A. Sherman and Edmund Taylor, Pittsburgh Pa. Progress Report of committee; published in July, 1927, issue of *Mechanical Engineering*.

A Laboratory Study of Slag Erosion, by S. J. McDowell. Presented before the American Refractories Institute, Pittsburgh, Pa., October 21, 1926, and published in the May, 1927, issue of *Mechanical Engineering*.

Temperatures in Powdered-Coal Furnaces Having Extended Radiant-Heat-Absorbing Surfaces, by R. A. Sherman. Progress Report of committee. Published in the April, 1927, issue of *Mechanical Engineering*.

Refractories—An Investigation of Boiler-Furnace Conditions as Related to Refractories Service, by Ralph A. Sherman, W. E. Rice, and L. B. Berger. Published in December, 1926, issue of *Mechanical Engineering*.

Refractories Service Conditions in Furnaces Burning Pittsburgh Coal on Chain Grates, by R. A. Sherman and W. E. Rice. Published in November, 1926, issue of *Mechanical Engineering*.

Elevators. Martin H. Christopherson, chairman. This committee was authorized in June, 1924, to study the function and operation of elevator safeties and buffers and their associated mechanisms and to develop methods of test for the approval of elevator safety devices.

Over $35,000 has been raised by the committee through the two large elevator associations in this country for the support of its research program at the Bureau of Standards in Washington. There an elevator has been erected in a test shaft and special instruments built and installed to make necessary test measurements and records. The installation is now complete and the instruments are undergoing calibration preliminary to the conduct of tests on various types of existing safety devices. The committee has held monthly meetings at A.S.M.E. headquarters in New York during the past year. To date $19,600 has been expended.

Worm Gears. Prof. Earle Buckingham, chairman. The committee was authorized in September, 1926, to investigate certain problems in connection with the action of worm drives and to recommend improvements in their design and manufacture.

At the 1926 Annual Meeting of the Society, Prof. Earle Buckingham presented a paper on "Worm-Wheel Contact" in which he outlined a suggested method of analyzing worm drive conditions. This method is to be used as the basis for the committee's investigational program. A questionnaire is now being circulated among worm drive manufacturers and users to collect existing data on worm drive problems. Cooperative tests on the basis of Professor Buckingham's method are being planned with these concerns.

Publications (1926-1927).

Worm Wheel Contact, by Prof. Earle Buckingham, July, 1927, issue of *Mechanical Engineering*.

Welding of Pressure Vessels. E. H. Ewertz, chairman. This committee was authorized in June, 1926, as a joint committee with the American

Bureau of Welding, to outline a program of investigations on Welded Pressure Vessels, to organize and direct research, and to analyze the results.

This is a large committee made up of tank manufacturers, users, and welding equipment manufacturers. An extensive program of tests on welded and riveted joints in pressure vessels has been planned for the purpose of obtaining accurate data on the strength of such joints. The results of these tests are to be used by the A.S.M.E. Boiler Code Committee in considering the revision of its code on Unfired Pressure Vessels. Fifteen thousand dollars, half of the required amount, has already been raised to carry on the investigational program of the committee.

Spark Arresters. This committee was authorized in September, 1926, to study the need of further development of various fire protective devices used on logging locomotives and donkey engines.

In the beginning the question was raised as to whether forest fires were not due rather to the improper use of fire protective equipment on steam generating apparatus operating in forest areas than to poor design or operation. Consequently with the cooperation of a Local Section and Student Branch in the three great lumbering regions in this country, the Northwest, Middle North, and South, preliminary surveys have been carried on through the summer and fall to determine the true situation. The final report of the surveys may be expected in print about the first of the year.

Saws and Knives. Carle M. Bigelow, chairman. This committee was authorized in September, 1926, to make a study of the uses and regrinding of band and circular saws and the various types of knives used in the lumber industry with the purpose of recommending improvements in their design and manufacture.

The committee was formally organized at the time of the recent national meeting of the Wood Industries Division at Grand Rapids, Mich. Keen interest has been shown by woodworking tool manufacturers, lumbering concerns, and wood users in the proposed activities and it is expected that an active research program will be instituted at the next meeting during the coming Annual Meeting of the Society.

Existing Supplies of Hardwoods. This committee was authorized in September, 1926, to study the needs of the woodworking industries for hardwoods and to determine the availability and possible application of tropical species to the requirements of these industries.

In the beginning the principal wood-using industries, woodworking machinery manufacturers, lumber associations, and importers in this country were approached to determine the need for and interest in the proposed project. The response indicated that there is a general appreciation of the need for new hardwood supplies to supplement the steadily decreasing supplies of native hardwoods. Some questions were raised, however, which indicate a need for a widespread educational campaign to develop support for this project. A committee has been organized and is now soliciting funds for support of an expedition into the tropics to determine the available stands of hardwoods, cost of marketing, and application to the needs of our wood-using industries. Testing facilities have been arranged for at the Forest Products Laboratory, Madison, Wis., and the Forestry Department of the University of Michigan.

Publications (1926-1927).

Tropical Hardwoods with Special Reference to Their Use in American Industries, by Major George P. Ahern. Published in January, 1927, issue of *Mechanical Engineering.*

Woods of the World with Emphasis on Tropical Woods, by Major George P. Ahern (Bibliography), Washington, D. C.

Airplane Dynamics. Prof. Alex. Klemin, chairman. This committee was authorized in January, 1927, to review and analyze existing data on airplane dynamics and to develop practical methods of calculations and rational formulas to replace present empirical methods.

The committee held its first meeting shortly after appointment and laid out a program of work. Progress has so far consisted in the individual efforts of the various members of the committee along the lines of this program.

Fuels. F. R. Wadleigh, chairman. This committee was authorized in September, 1927, to collect existing data on Fuels Research, to coordinate present research efforts where possible and advisable, and to carry on research on specific problems in this field.

This project was recommended to the main research committee by the Survey Committee of the Fuels Division. The organization of the committee has been completed and a survey of existing data of fuels research begun.

Velocity Measurement of Fluid Flow. This committee was authorized in September, 1927, to develop experimentally a new theory of fluid flow measurements. The University of Minnesota recently requested support for this project through the Engineering Foundation. A small committee has been organized to review and advise on the experimental work and to raise funds for its prosecution.

Bearing Metals. C. H. Bierbaum, chairman. This special committee has been inactive during the year.

Committees in Process of Organization:
Special Committee on Cutting Edges (Thin Metal Plates).
Special Committee on Strength of Cylindrical Vessels under Pressure.
Special Committee on Absorption of Radiant Heat in Boiler Furnaces.
Joint Committee with A.S.R.E. on Physical Constants of Refrigerants.

Standardization

Standardization in mechanical engineering has made considerable progress during the past year. The A.S.M.E. now holds sponsorship or joint sponsorship for 23 projects or sectional committees and 100 sub-committees, and sub-groups have been organized to carry the work forward. These committees have worked steadily during the past year, many of them having completed or practically completed the tasks assigned to them. Summaries of this progress follow.

Publicity. Your Committee has supplied the technical and daily press throughout the year with a considerable amount of material relative to the standards which have been developed by the sectional committees sponsored by the Society. In addition it has caused to be published in *Mechanical Engineering* approximately 46 pages of text during the same period.

Personnel. On October 1, 1927, 123 Committees were at work on the A.S.M.E. standardization program. These committees included in their personnel 567 members of the Society and 497 non-members.

Transmission Chains and Sprockets. F. V. Hetzel, chairman. This sectional committee held a reorganization meeting on December 10, 1926, at which sub-committees on (1) Roller Chains Standardization and (2) Silent Chain Standardization were appointed. The sub-committee on Roller Chains held a meeting on September 1, at Cleveland, Ohio.

Shafting. C. M. Chapman, chairman. This committee completed two standards for Diameters and Lengths of Shafting and Square and Flat Stock Keys in 1925. These standards were reprinted in September, 1927. During the past year two additional standards were completed, namely, Plain Taper Stock Keys and Gib Head Stock Keys. These were approved by the A.E.S.C. in February, 1927. A fifth standard developed by this committee entitled "Code for Design of Transmission Shafting," is now before the A.E.S.C. for approval as a tentative American standard. Sub-committee No. 5 on Woodruff Keys and Keyways at its meeting on April 15, 1927, voted to revamp the tables which they had previously drafted.

Plain Limit Gages. Eugene C. Peck, chairman. This sectional committee's first standard entitled, "Tolerances, Allowances and Gages for Metal Fits," was published in December, 1925, and was reprinted in June of this year. Its second standard, the work of sub-committees Nos. 2 and 3, "Methods of Gaging and Specifications for Plain Limit Gages," was re-edited and revised page proofs distributed in May, 1927. An attempt is now being made to coordinate this report with similar material recently developed by the Gage Design Committee.

Ball Bearings. William R. Strickland, chairman. A meeting of this committee was held in New York on September 14, 1927. The standards for radial bearings are now in type and will be issued soon.

Elevators. Bassett Jones, chairman. The A.E.S.C. and the sponsor bodies have this year questioned the advisability of continuing this committee since its work cannot start until the research work which is now being carried on by the A.S.M.E. Special Research Committee on Elevators is well along toward completion.

Standardization of Gears. Benjamin F. Waterman, chairman. The past year has been one of adjustment for this sectional committee. Some of the sub-committees have been active and it is expected that very satisfactory results will be seen this Fall. The standard for Spur Gear Tooth Form, 14½ Degree Composite System, and 20 Degree Stub Involute System, was published in January, 1927. The Sub-Committee on Worm Gears is preparing material which is soon to be ready to present to the Committee. Sub-committee No. 8 on materials has completed its Proposed Specifications for Forged and Rolled Carbon Steel for Gears, which is one section of the materials standard. Page-proofs are now out for criticism and comment preparatory to the submission of the final draft for letter ballot of the sub-committee.

Standardization and Unification of Screw Threads. Luther D. Burlingame, chairman. A reprint of this standard in the form originally published was prepared in June, 1927, to meet the demand until the sectional committee is ready to take up the revision and extension of this standard.

Pipe Flanges and Flanged Fittings. Collins P. Bliss, chairman. The Sectional Committee on Pipe Flanges and Flanged Fittings has made considerable progress during the past year, having completed five of its standards for submission to the sponsors and A.E.S.C. for approval.

Sub-Committee on Cast Iron Flanges and Flanged Fittings. Arthur M. Houser, chairman. The standards for Cast Iron Flanges and Flanged Fittings for 125 and 250 lb. pressures were sent to the A.E.S.C. for approval on August 11. It was later found necessary to change the material specifications slightly so they were withdrawn, and on September 27 these changes were submitted to Sub-Committees Nos. 1 and 4 for letter ballot.

The 25 lb. Standard Cast Iron Flanges and Flanged Fittings is now with the sub-committee No. 1 for letter ballot, which is nearly completed.

Sub-Committee on Screwed Fittings. Stanley G. Flagg, chairman. The standards for 125 and 250 lb. Cast Iron Screwed Fittings and 150 lb.

Malleable Iron Screwed Fittings are before the A.E.S.C. for approval as Tentative American Standards. The proposed Tentative American Standard for Long Turn Sprinkler Fittings, the third standard to be drafted by this sub-committee, is now being voted on by the members of the sectional committee.

Sub-Committee on Steel Flanges and Fittings. Collins P. Bliss, chairman. The standards for Steel Pipe Flanges and Flanged Fittings were approved by the A.E.S.C. and published in pamphlet form in June, 1927. This work was very well received by the industry.

Bolt, Nut and Rivet Proportions. Arthur E. Norton, chairman. Two of the standards developed by this sectional committee were approved by the sponsors and A.E.S.C.

Sub-Committee on Large and Small Rivets. H. N. Wallin, chairman. The standard for small rivets was approved by the A.E.S.C. and published in pamphlet form in July, 1927. A tentative draft of the standard on large rivets is practically completed and it will shortly be set in type preparatory to general distribution for criticism and comment in printers' proof form. The proposed standard for Tinners', Coopers' and Belt Rivets was referred back to the sub-committee by the S.A.E., one of the joint sponsors, and it is now being reconsidered by the sub-committee from which a report is expected shortly.

Sub-Committee on Wrench Head Bolts and Nuts. Thomas C. Kinkaid, chairman. The final report of this sub-committee on Wrench Head Bolts and Nuts and Wrench Openings was completed in January, 1926. It then went to the sectional committee for letter ballot and, after approval by the sponsor bodies and the A.E.S.C., it was printed in final pamphlet form under date of February, 1927.

Sub-Committee on Slotted Head Proportions. E. Winsor Reed, chairman. This sub-committee held a meeting in Cleveland on June 28 at which a considerable number of changes in its present draft standard were discussed. The committee is now at work upon these changes and the chairman expects to call a meeting in October.

Sub-Committee on Track Bolts and Nuts. C. W. Squier, chairman. This committee is cooperating closely with the Rail Committee of the American Railway Engineering Association in the development of standards for (a) Elliptic Neck Track Bolts and (b) Oval Neck Track Bolts. There is now complete agreement on the dimensions of the first named proposed standard but some of the large manufacturers take exception to certain dimensions of the latter.

To establish the facts the Buffalo Bolt Company and the Bethlehem Steel Company were requested to supply sets of bolts having the proposed standard dimensions. The New York Central Railroad and the Pennsylvania Railroad in turn agreed to test these bolts in their laboratories. The results of these tests were distributed to the members of the sub-committee and the A.R.E.A. Rail Committee in April, 1927.

Sub-Committee on Round Unslotted Head Proportions. W. M. Horton, chairman. In April the S.A.E. referred this proposed standard back to the sectional committee for changes. After a considerable amount of correspondence with the manufacturing members of the committee this report is going forward to the A.E.S.C.

Sub-Committee on Plow Bolts. E. P. Stahl, chairman. Proposed standard in the hands of the sponsor bodies.

Identification of Piping Systems. Amos S. Hebble, chairman. This proposed scheme has been reedited during the past year and it is at present with the members of the sectional committee for vote by letter ballot.

Small Tools and Machine Tool Elements. Harry E. Harris, chairman, of the central committee.

Sub-Committee on T-Slots, Their Bolts, Nuts and Cutters. Erik Oberg, chairman. Early in the year this sub-committee presented its report entitled, "T-Slots, Their Bolts, Nuts, Tongues and Cutters," to the sponsor societies and the A.E.S.C. After approval as a tentative American standard it was printed in final pamphlet form in March, 1927.

Sub-Committee on Tool Holders and Tool Post Openings. Paul M. Mueller, chairman. The committee has redrafted its tentative proposal and copies of it are now out for comment by the committee, sponsors, and various small tool groups.

Sub-Committee on Machine Tapers. Ernest F. DuBrul, chairman. This sub-committee has prepared a questionnaire which has been sent to approximately 600 manufacturers and users of this small tool to determine if the general adoption of one machine taper were approved and if so whether or not an angle of $\frac{3}{4}$ inch to the foot were favored to replace the present practice of $\frac{1}{2}$, $\frac{6}{0}$ and $\frac{5}{8}$ inch to the foot.

Sub-Committee on Milling Cutters. C. W. Machon, chairman. This sub-committee at its meeting in May at White Sulphur Springs voted to revamp the early drafts of its several proposed standards which it had distributed for comment and is now at work upon these redrafts.

Engineering and Scientific Symbols and Abbreviations. J. Franklin Meyer, chairman. The four sub-committees of the sectional committee have been active during the past year.

Sub-Committee on Symbols for Hydraulics. G. E. Russell, chairman. This sub-committee has developed and approved its proposed tentative standard on Symbols for Hydraulics and this proposal is now being set up in printer's proof form preparatory to distribution to the sectional committee and other interested individuals for criticism and comment.

Sub-Committee on Heat and Thermodynamics. Sanford A. Moss, chairman. Sub-committee No. 3 has approved its proposed tentative standard on Symbols for Heat and Thermodynamics and the proposal is now in the hands of the members of the sectional committee and the technical press in printer's proof form for critical review.

Sub-Committee on Aeronautical Symbols. Joseph S. Ames, chairman. The proposed standard developed and approved by this sub-committee is now before the sectional committee and technical press for criticism and comment.

Sub-Committee on Mathematical Symbols. E. V. Huntingdon, chairman. Sub-committee No. 6 has completed its proposed standard which has been submitted to the joint sponsors for approval and transmission to the A.E.S.C. for approval as a Tentative American Standard.

Plain and Lock Washers. Victor E. Bertrandis, chairman. This sectional committee has made very little progress during the past year.

Machine Pins. The sectional committee on Machine Pins is without a chairman, hence has made little progress during the past year.

Drawings and Drafting Room Practice. Franklin DeR. Furman, temporary chairman. Two sub-committees have been organized in addition to the three which were designated at the organization meeting of the sectional committee. These are on "Layout" and "Line Work." Two of these sub-committees have drafted tentative reports which are now with the members of the sub-committees for criticism and comment. Sub-committee No. 3 on Lettering has prepared a questionnaire which will be sent shortly to about 900 interested firms and individuals.

Pressure Piping. Edwin B. Ricketts, chairman. The organization meeting of the sectional committee was held on November 12, 1926, at which

time the sub-committee on Plan and Scope (1) was appointed. Since this meeting seven sub-committees have been formed to develop sections of the code covering (2) Power Piping, (3) Hydraulic Piping, (4) Gas and Air Piping, (5) Refrigerating Piping, (6) Oil Piping, (7) Piping Materials and (8) Fabrication Details. Already the sub-committees on Power Piping, Gas and Air Piping, and Oil Piping have prepared tentative drafts of their reports.

Graphic Presentation. Ernest F. DuBrul, chairman. This sectional committee's organization meeting was held on December 3, 1926, and since then six sub-committees have been formed covering (1) Plan and Scope, (2) Terminology, (3) Time Series Charts, (4) Non-Time Series Charts, (5) Survey of Current Practice and (6) Engineering and Scientific Graphs. Sub-committee No. 5 on Survey of Current Practice has sent a circular letter to approximately 100 associations requesting that the recipients send the names of individuals in their membership particularly interested in charting statistics.

New Projects. During the year 1926-1927 the Society accepted sole or joint sponsorships for the following projects under the A.E.S.C. Procedure: Wire and Sheet Metal Gages, Wrought Iron and Wrought Steel Pipe and Tubing, Certain Dimensions for Electric Motor Frames and Plumbing Equipment.

Representation. At the request of cooperating organizations the A.S.M.E. has appointed twenty-six (26) of its members to represent it officially on sectional committees for which the Society is not sponsor or joint sponsor.

Power Test Codes

Fifteen of the twenty-four Codes on the Program of the Committee on Power Test Codes are now in final pamphlet form. During the period from 1922 to 1926 inclusive, the following twelve (12) codes were issued in pamphlet form:

Code on General Instructions
Code on Definitions and Values
Test Codes for:
- Stationary Steam Boilers
- Reciprocating Steam Engines
- Reciprocating Steam-Driven Displacement Pumps
- Displacement Compressors and Blowers
- Condensing Apparatus
- Feedwater Heaters
- Refrigerating Systems
- Evaporating Apparatus
- Internal-Combustion Engines
- Hydraulic Power Plants and Their Equipment

This year, 1926-1927, three additional codes appeared in pamphlet form:
Test Codes for:
- Solid Fuels
- Steam Locomotives
- Speed-Responsive Governors

The first printings of the following nine codes which have been published in pamphlet form were exhausted during the past two years, and the codes have been reprinted in quantity to supply the demand. In some cases they were considerably revised:

Code on General Instructions
Test Codes for:
Stationary Steam Boilers
Reciprocating Steam Engines
Reciprocating Steam-Driven Displacement Pumps
Feedwater Heaters
Refrigerating Systems
Evaporating Apparatus
Internal-Combustion Engines
Hydraulic Power Plants and Their Equipment

The Test Code for Centrifugal and Rotary Pumps has passed completely through the procedure laid down by the main committee and has been approved and adopted by the Council as a standard practice of the Society. It will soon be available in pamphlet form.

A résumé of the progress which has been made so far in the preparation of Instruments and Apparatus is as follows:

Chapter 1, General Considerations, appeared in the February, 1923, issue of *Mechanical Engineering*. Chapter 3 on Temperature Measurement, Section 1, General, was published in *Mechanical Engineering* in December, 1925, and Section 6, Glass Thermometers, in the April and May, 1926, issues; Chapter 21, Condenser Leakage Tests, was published in the November, 1925, issue. Part I—Barometers, Chapter 2, Pressure Measurement, has been approved by its individual committee and will soon be published in *Mechanical Engineering*.

Through its representatives on the U. S. National Committee of the International Electrotechnical Commission, the Society and the main committee on Power Test Codes participated in the New York meeting of the I.E.C. held here in April, 1926. Following the New York meeting, the U. S. National Committee was designated as the Secretariat of the I. E. C. Advisory Committee No. 4 on Prime Movers. Dr. Fred R. Low, Chairman of the main committee on Power Test Codes was named as director and C. B. LePage as assistant director. Accordingly, in preparation for a meeting of the Advisory Committee held at Bellagio, Lake Como, Italy, during the period between September 4 and 21, 1927, the Secretariat developed a proposal which it believed would assist in unifying and accelerating the work of the I.E.C. Advisory Committee on Prime Movers. The proposal related to the establishment of a definite outline for international agreements on all the proposed test specifications or codes. This proposal was supported by four documents prepared from material previously prepared by the A.S.M.E. test code committees on Steam Turbines, Hydraulic Power Plants and Their Equipment, Internal-Combustion Engines, and Reciprocating Steam Engines.

Dr. William F. Durand, Past-President of the Society, attended the Bellagio Meeting as one of the official delegates of the United States and he was elected to preside at the eight sessions of the advisory committee on Prime Movers.

The twenty individual committees and the main committee now include in their personnel one hundred and fourteen members of the Society and twelve non-members.

Safety

The Safety Committee of the Society has been active in the past year in various ways, particularly in an endeavor to increase the interest in industrial safety. As reported last year, the committee, largely upon the suggestion of Secretary Rice, squarely accepted the proposition that the engi-

neering profession should be the leader in safety, and its plans have been laid accordingly. These plans include not only giving safety its justified place in our own proceedings, but also in developing cooperation on this phase of engineering with the other Founder Societies, and with the National Safety Council. The work which has been done by the committee during the past year is to be seen in outline in the following:

Accident Prevention at the Larger Meetings. The Safety Committee, through its chairman, has communicated with selected speakers at the various large national, regional or sectional meetings of the Society, held during 1927, and has requested them to introduce matter relating to accident prevention in their papers as far as may be appropriate. This is a continuation of the work begun by the committee in the previous year.

In the case of the regional meeting at Seattle the committee received a report from the secretary of the Society which indicated that this activity has borne excellent fruit. From this and other information it is believed that the work will be gradually effective in causing writings of papers at Society meetings to introduce a reasonable and justifiable amount of material on accident prevention as a matter of regular course, that is, when their papers relate to design, installation, and operation. In most cases those to whom communications were sent agreed to perform the service asked, mostly with enthusiasm, though in a few instances the subject matter of papers as it was being treated by the authors was not appropriate to the purpose.

The Annual Meeting. The committee has also written authors who will present papers at the annual meeting in December in New York, and has assurance from most of them that their papers are appropriate to the subject, and that they will, therefore, give reasonable attention to accident prevention. It is believed that this convention will more nearly deal equitably with safety than any others which have been held, and that it may prove to be a model so far as accident prevention is concerned. The committee does not desire to have safety over-emphasized, but it hopes that it may gradually take its appropriate place with other phases of engineering in all of the Society meetings.

Safety and Local Sections. The committee has arranged with its liaison member, Mr. Sanford, Vice-President of the National Safety Council, to have the Safety Council select industrial men of competence and experience in the safety field to cooperate with the Local Sections by suggesting safety speakers, where the topics of the meetings justify presentations on that subject, by keeping in contact with authors of local papers for the purpose of having safety properly introduced, and by cooperating in any other ways which may be helpful. Letters have been sent to these liaison representatives from Society headquarters, and in most cases from the local sections, so that arrangements for cooperation have been already quite well established.

Safety and Student Branches. Within a recent time also the committee has obtained through the same liaison officer appointees to cooperate with the student branches. These have been sent to headquarters and arrangements for their cooperation with student branches will be properly made. In connection with these latter representatives, it is expected that they will take a direct part not only in aiding in matters having to do with safety features at meetings, but by advising with the faculties as to safe practices in the college plants, and also by using their best judgment in aiding the development in the curricula of the institutions of a reasonable and proper amount of study of safety practices by the students. By this arrangement the committee hopes that graduating classes of engineers in

future years will be acquainted with the safety problems of the country and have some knowledge of how they should be solved.

Safety Literature. During the year the committee has been instrumental in securing publication in *Mechanical Engineering* of some material relating to accident prevention, but the development of this work has not progressed as yet to the point that is desirable.

Safety Codes. The present safety program of the American Engineering Standards Committee includes 43 safety codes. This Society is sponsor or joint sponsor for the following six sectional committees which are developing safety codes under the procedure of the A.E.S.C. It also has 19 representatives on as many similar committees.

Sectional Committee on Safety Code for Mechanical Power Transmission Apparatus
Sectional Committee on Safety Code for Elevators
Sectional Committee on Safety Code for Machinery for Compressing Air
Sectional Committee on Safety Code for Conveyors and Conveying Machinery
Sectional Committee on Safety Code for Cranes, Derricks and Hoists
Sectional Committee on Safety Code for Mechanical Power Control

Personnel. To October 1 the foregoing sectional committees had organized 24 sub-committees and sub-groups which with the main committee make a total of 30 committees of this Society at work on the safety program. There are 62 A.S.M.E. members and 133 non-members serving on these committees.

Sectional Committees. The sectional committee on Safety Code for Elevators completed and published its code in 1925. However, a sub-committee on Research Recommendations and Interpretations formed in 1926 has met practically every month during the past year. It devoted some of its meetings to interpretations and recommendations, while during the remainder it functioned as a special research committee of the Society. During the year its secretary, John B. Dickinson, has distributed 14 copies of the Safety Code for Elevators to various state officials.

The sectional committee on Safety Code for Mechanical Power Transmission Apparatus completed the revision of the 1923 Code during the year. In its revised form it was approved by the sponsor organizations and was transmitted by them to the A.E.S.C. for approval.

The six sub-committees of the sectional committee on Safety Code for Conveyors and Conveying Machinery have been active during the past year. Sub-commmittee No. 1 on Gravity Conveyors and Chutes, Live Roll Conveyors, has drafted its first report. Sub-committee No. 4 on Spiral and Drag or Scraper Conveyors and Cable Flight Conveyors has drafted two reports and is now further revising them. The other sub-committees are also working on draft reports and it is expected that these draft sections of the code will be ready for presentation at the next sectional committee meeting in December.

The sectional committee on Safety Code for Cranes, Derricks, and Hoists held its organization meeting on November 4, 1926, and has been busy since that time rounding out its personnel and organizing seven sub-committees. The organization meetings of these sub-committees were held in June, 1927. Sub-committee No. 1 on Overhead and Gantry Cranes, sub-committee No. 2 on Locomotive and Tractor Cranes, and sub-committee No. 5 on Slings, Chains and Hooks have prepared drafts of their sections of the code which are to be discussed at a series of meetings to be held during the week of October 24. Sub-committees No. 3 on Derricks and No. 6 on Wire Rope and Attachments, Sheaves and Pulleys have submitted tentative reports.

The A.S.M.E. has representation also on the following Safety Code Committees organized under the procedure of the American Enginering Standards Committee.

Safety Code Correlating Committee
Sectional Committees on:
- Safety Code for Abrasive Wheels
- Safety Code for Aeronautics
- Safety Code for Floor Openings, Railings and Toe Boards
- Safety Code for Forging and Hot Metal Stamping
- Safety Code for Industrial Sanitation
- Safety Code for Ladders
- Safety Code for Laundries
- Safety Code for Lighting Factories, Mills, and Other Work Places
- Safety Code for Logging and Sawmill Machinery
- Safety Code for Machine Tools
- Safety Code for Mechanical Refrigeration
- Safety Code for Paper and Pulp Mills
- Safety Code for Power Presses
- Safety Code for Rubber Mill Machinery
- Textiles Safety Code
- Ventilation Safety Code
- Safety Code for Walkway Surfaces
- Safety Code for Amusement Parks
- Safety Code for Window Washing

Boiler Code

The work of the Special Boiler Code Committee during the fiscal year ending September 30, 1927, has been continuously devoted to the service of the engineering profession in general, and the steam boiler industry in particular.

The outstanding accomplishment of the Boiler Code Committee during the past fiscal year has been the publication of revisions and addenda to the Boiler Codes in the distinctive pink-colored sheets. This is the result of the new procedure which the committee has adopted of making revisions in the Code when necessary, instead of holding public hearings once every four years. These addenda sheets cover revisions in the Power Boiler, Material Specifications, Low-Pressure Heating Boilers, Miniature Boilers, and Unfired Pressure Vessel Sections of the Code. They have been widely distributed to manufacturers in possession of the various sections of the code. It is the intent of the committee to incorporate the changes in each section of the code as the need for a new edition arises. In this way, the rules will be kept up-to-date.

Plans are now under way to reprint the Power Boiler Section, the Miniature Boiler Section, and the Suggested Rules for the Care of Power Boilers. The stock supply of each of these sections is almost exhausted and in each case all completed revisions thereof will be incorporated.

The special committee appointed to confer with the American Marine Standards Committee has, during the past fiscal year, considered the matter of bringing the specifications for Marine Boiler Steel into close conformity with the corresponding specification of the A.S.M.E. Boiler Code. This work is as yet in a tentative stage, and the special committee awaits further advice from the A.M.S.C. as to the status thereof.

In view of the demands from manufacturers for representatives of the Boiler Code Committee to witness tests on structures that are difficult of

computation, to determine the maximum allowable working pressure, a Proposed Standard Practice for Making a Hydrostatic Test on a Boiler Pressure Part has been formulated and published in *Mechanical Engineering*. Thorough tests in accordance with these proposed rules are being carried on by various manufacturers to prove their practicability, after which the committee will take the necessary steps for their final adoption as standard practice of the Society.

An important public hearing was held by the Boiler Code Committee on the evening of March 17, 1927, to consider the question of design of dished heads as required by the Code for Unfired Pressure Vessels. This meeting was based upon the results of a destructive test of a very large fusion-welded tank designed for operation at 300 lb. working pressure, which was described in four papers that were presented at a joint meeting of the A.S.M.E. and the American Welding Society on January 4, 1927, and later appeared in several issues of *Mechanical Engineering*. Invitations had been sent to all interested parties, and the meeting was attended by about 50 people. The report of the hearing was referred to a special committee which is considering the advisability of a revision of the code to cover dished heads.

Extensive cooperation has been carried on with the American Petroleum Institute to meet the requirements of the oil-field boiler manufacturers in the provisions in the code for diameters of domes located on the barrels of boilers and the question of drilling of staybolts. The result has been the revision of the code requirements to cover these items, which appear to satisfy the manufacturers.

The committee has held eight regular meetings during the past fiscal year, covering its regular interpretation service upon the various sections of the code, and in addition recommending revisions and addenda. The meetings appear to be of as great importance to the boiler and pressure vessel industry as ever, because questions of even more vital nature than ever before continue to be submitted and due to recent developments in the industry seem to be more difficult of solution than ever before.

Two appointments have been made on the main committee, i.e., Frank B. Howell, representing the National Boiler and Radiator Manufacturers Association, and H. E. Aldrich, to replace C. E. Fisher, deceased.

The committee wishes to report, with regret, the resignation of its secretary, Casin W. Obert, who has formed a connection with the Union Carbide and Carbon Research Laboratories, Long Island City, N. Y. However, Mr. Obert has not only been appointed a member of the committee, but also honorary secretary. Suitable resolutions have been drawn up, and a handsome gold watch was presented to express the appreciation of the committee of the splendid work which Mr. Obert has accomplished during sixteen years of secretaryship.

In order to continue the secretarial work of the Boiler Code Committee office, it has been decided, in view of the decline in bona-fide technical work, that it might be carried on by Miss Martha Jurist, who has been Mr. Obert's assistant for many years. Accordingly, Miss Jurist has been appointed acting secretary to the committee, with the privilege of securing an assistant to handle the work, and instructed to refer technical inquiries to Mr. Obert or to available members of the executive committee.

HONORARY MEMBERS

Honorary Members in Perpetuity

ALEXANDER LYMAN HOLLEY, Deceased Founder of the Society.
JOHN E. SWEET, Deceased Founder of the Society.
HENRY ROSSITER WORTHINGTON, Deceased Founder of the Society.

Honorary Members

	Elected
John A. F. Aspinall	1911
W. W. Atterbury	1925
Charles de Freminville	1919
Thomas Alva Edison	1904
Marshal Ferdinand Foch	1921
George W. Goethals	1917
Robert S. Griffin	1920
Nathaniel Greene Herreshoff	1921
Herbert Hoover	1925
Charles Algernon Parsons	1920
Grande Ufficiale Ing. Pio Perrone	1920
Auguste C. E. Rateau	1919
Charles M. Schwab	1918
Ambrose Swasey	1916
Wm. Cawthorn Unwin	1898
Samuel M. Vauclain	1920
Oskar von Miller	1912
Worcester R. Warner	1925
Lord William Weir	1920
Orville Wright	1918
Alfred Fernandez Yarrow	1914

Deceased Honorary Members

	Elected	Died
Horatio Allen	1880	1889
Sir Wm. Arrol	1905	1913
Benjamin Baker	1886	1907
Johann Bauschinger	1884	1893
Henry Bessemer	1891	1898
Frederick Bramwell	1884	1904
John A. Brashear	1908	1920
Gustave Canet	1900	1908
Andrew Carnegie	1907	1919
Daniel K. Clark	1882	1896
Rudolph Clausius	1882	1888
John Coode	1889	1892
Peter Cooper	1882	1883
Carl Gustave Patrick deLaval	1912	1913
Rudolph Diesel	1912	1913
James Dredge	1886	1906
V. Dwelshauvers-Dery	1886	1913
Gustave Eiffel	1889	1923
Sir Douglas Fox	1900	1921
John Fritz	1900	1913
F. Grashof	1884	1893
O. Hallauer	1882	1883
Chas. S. Haswell	1905	1907
Gustav Herrmann	1884	1907
G. A. Hirn	1882	1890
Joseph Hirsh	1889	1901
Robert W. Hunt	1920	1923
Benjamin Franklin Isherwood	1894	1915
Henri Leaute	1891	1918
Erasmus D. Leavitt	1915	1916
Anatole Mallet	1912	1919
Charles H. Manning	1913	1919
Geo. W. Melville	1910	1912
Chas. T. Porter	1890	1910
Edward J. Reed	1882	1906
Franz Reuleaux	1882	1905
Henri Schneider	1882	1898
C. William Siemans	1882	1883
John E. Sweet	1904	1916
Henry R. Towne	1921	1924
Henri Tresca	1882	1885
Francis A. Walker	1886	1897
Sir William H. White	1900	1913
George Westinghouse	1897	1914

PAST OFFICERS

ALEXANDER L. HOLLEY, Chairman of the Meeting for Organization of The American Society of Mechanical Engineers.....Died January 29, 1882

Presidents

1880-1882	R. H. THURSTON	Died October 25, 1903
1883	E. D. LEAVITT	Died March 11, 1916
1884	JOHN E. SWEET	Died May 8, 1916
1885	J. F. HOLLOWAY	Died September 1, 1896
1886	COLEMAN SELLERS	Died December 28, 1907
1887	GEORGE H. BABCOCK	Died December 16, 1893
1888	HORACE SEE	Died December 14, 1909
1889	HENRY R. TOWNE	Died October 15, 1924
1890	OBERLIN SMITH	Died July 19, 1926
1891	ROBERT W. HUNT	Died July 11, 1923
1892	CHARLES H. LORING	Died February 5, 1907
1893-1894	ECKLEY B. COXE	Died May 13, 1895
1895	E. F. C. DAVIS	Died August 6, 1895
1895	CHARLES E. BILLINGS	Died June 4, 1920
1896	JOHN FRITZ	Died February 13, 1913
1897	WORCESTER R. WARNER	Cleveland, Ohio
1898	CHARLES WALLACE HUNT	Died March 27, 1911
1899	GEORGE W. MELVILLE	Died March 17, 1912
1900	CHARLES H. MORGAN	Died January 10, 1911
1901	S. T. WELLMAN	Died July 11, 1919
1902	EDWIN REYNOLDS	Died February 19, 1909
1903	JAMES M. DODGE	Died December 4, 1915
1904	AMBROSE SWASEY	Cleveland, Ohio
1905	JOHN R. FREEMAN	Providence, R. I.
1906	F. W. TAYLOR	Died March 21, 1915
1907	FREDERICK R. HUTTON	Died May 14, 1918
1908	M. L. HOLMAN	Died January 4, 1925
1909	JESSE M. SMITH	Died April 1, 1927
1910	GEORGE WESTINGHOUSE	Died March 12, 1914
1911	E. D. MEIER	Died December 15, 1914
1912	ALEX. C. HUMPHREYS	Died August 14, 1927
1913	W. F. M. GOSS	New York, N. Y.
1914	JAMES HARTNESS	Springfield, Vt.
1915	JOHN A. BRASHEAR	Died April 8, 1920
1916	D. S. JACOBUS	New York, N. Y.
1917	IRA N. HOLLIS	Worcester, Mass.
1918	CHARLES T. MAIN	Boston, Mass.
1919	MORTIMER E. COOLEY	Ann Arbor, Mich.
1920	FRED J. MILLER	New York, N. Y.
1921	EDWIN S. CARMAN	Cleveland, Ohio
1922	DEXTER S. KIMBALL	Ithaca, N. Y.
1923	JOHN L. HARRINGTON	Kansas City, Mo.
1924	FRED R. LOW	New York, N. Y.
1925	W. F. DURAND	Stanford Univ., Cal.
1926	W. L. ABBOTT	Chicago, Ill.
1927	CHARLES M. SCHWAB	New York, N. Y.

NOTE.—According to the Constitution, Article C7, Sec. 2, the five surviving Past Presidents who last held office shall be members of the Council, with all the rights, and privileges and duties of the other members of the Council.

Vice-Presidents

HENRY ROSSITER WORTHINGTON
April-December, 1880
COLEMAN SELLERS
April, 1880-November, 1881
ECKLEY B. COXE
April. 1880-November, 1881
QUINCY A. GILMORE
April,1880-December, 1880
WM. H. SHOCK
April, 1880-November, 1882
ALEXANDER L. HOLLEY
April, 1880-January, 1882
FRANCIS A. PRATT
December, 1880-November, 1881
THEO. N. ELY...1881-November, 1882
WASHINGTON JONES
1881-November, 1882
WM. P. TROWBRIDGE
1881-November, 1883
E. D. LEAVITT..1881-December, 1882
CHAS. E. EMERY.....1881-1883
S. B. WHITING.....1882-1883
JOHN FRITZ 1882-1884
HENRY MORTON 1882-1884
WM. METCALF 1882-1884
A. B. COUCH.....1883-1885
W. R. ECKART.....1883-1885
J. V. MERRICK.....1883-1885
CHAS. W. COPELAND.....1884-1886
HENRY R. TOWNE.....1884-1886
COLEMAN SELLERS 1884-1885
OLIN H. LANDRETH.....1885-1886
ALLAN STIRLING 1885-1887
HORACE SEE 1885-1887
CHAS. H. LORING.....1885-1887
JOS. MORGAN, JR.....1886-1888
CHAS. T. PORTER.....1886-1888
HORACE S. SMITH.....1886-1888
W. S. G. BAKER.....1887-1889
H. G. MORRIS.....1887-1889
C. J. H. WOODBURY.....1887-1889
THOS. J. BORDEN.....1888-1890
WILLIAM KENT 1888-1890
CHARLES B. RICHARDS.....1888-1890
DE VOLSON WOOD.....1889-1891
JOEL SHARP 1889-1891
GEO. W. WEEKS.....1889-1891
STEPHEN W. BALDWIN.....1890-1892
ALEX. GORDON 1890-1892
JNO. F. PARKHURST.....1890-1892
GEORGE I. ALDEN.....1891-1893
E. F. C. DAVIS.....1891-1893
IRVING M. SCOTT.....1891-1893
CHARLES WALLACE HUNT..1892-1894
EDWIN REYNOLDS 1892-1894
THOS. R. PICKERING.....1892-1894
PERCIVAL ROBERTS, JR...1893-1895
H. J. SMALL.....1893-1895
CHARLES E. BILLINGS.....1893-1895
FRANK H. BALL.....1894-1896
M. L. HOLMAN.....1894-1896
JESSE M. SMITH.....1894-1896
FRANCIS W. DEAN.....1895-1897
CHARLES H. MANNING.....1895-1897
GEORGE W. MELVILLE.....1895-1897
EDWIN S. CRAMP.....1896-1898
W. F. DURFEE.....1896-1898
S. T. WELLMAN.....1896-1898
CHARLES M. JARVIS.....1897-1899
WALTER S. RUSSEL.....1897-1899
JOHN C. KAFER.....1897-1899
E. D. MEIER.....1898-1900
GEORGE R. STETSON.....1898-1900
B. H. WARREN.....1898-1900
JESSE M. SMITH.....1899-1901
STEVENSON TAYLOR 1899-1901
DAVID TOWNSEND 1899-1901
JAMES M. DODGE.....1900-1902
AMBROSE SWASEY 1900-1902
ARTHUR M. WAITT.....1900-1902
M. E. COOLEY.....1901-1903
WILFRED LEWIS 1901-1903
M. P. HIGGINS.....1901-1903
JAMES CHRISTIE.....1902-1904
F. H. DANIELS.....1902-1904
JOHN R. FREEMAN.....1902-1904
D. S. JACOBUS.....1903-1905
WILLIAM J. KEEP.....1903-1905
M. L. HOLMAN.....1903-1905
S. M. VAUCLAIN.....1904-1906
H. H. WESTINGHOUSE.....1904-1906
FRED. W. TAYLOR.....1904-1905
GEO. W. BARRUS.....1905-1906
WALTER M. MCFARLAND...1905-1907
ROBT. C. MCKINNEY.....1905-1907
EDWARD N. TRUMP.....1905-1907
PHILETUS W. GATES.....1906-1908
JOHN W. LIEB, JR.....1906-1908
ALEX DOW 1906-1908
L. P. BRECKENRIDGE.....1907-1909
FRED J. MILLER.....1907-1909
ARTHUR WEST 1907-1909
GEO. M. BOND.....1908-1910
R. C. CARPENTER.....1908-1910
F. M. WHYTE.....1908-1910
CHAS. WHITING BAKER....1909-1911
W. F. M. GOSS.....1909-1911
E. D. MEIER.....1909-1910
ALEX. C. HUMPHREYS.....1910-1911
GEO. M. BRILL.....1910-1912
EDWIN M. HERR.....1910-1912
HENRY H. VAUGHAN.....1910-1912
WM. F. DURAND.....1911-1913
IRA N. HOLLIS.....1911-1913
THOS. B. STEARNS.....1911-1913
I. E. MOULTROP.....1912-1914
H. G. STOTT.....1912-1914
JAMES HARTNESS 1912-1913
E. B. KATTE.....1913-1914
H. L. GANTT.....1913-1915
E. E. KELLER.....1913-1915
H. G. REIST.....1913-1915
HENRY HESS.....1914-1916
GEO. W. DICKIE.....1914-1916

JAMES E. SAGUE.....1914-1916
WM. B. JACKSON.....1915-1917
J. SELLERS BANCROFT.....1915-1917
JULIAN KENNEDY 1915-1917
CHARLES H. BENJAMIN....1916-1918
ARTHUR M. GREENE, JR...1916-1918
CHARLES T. PLUNKETT....1916-1918
SPENCER MILLER 1917-1919
MAX TOLTZ.....1917-1919
JOHN HUNTER 1917-1919
FRED R. LOW.....1918-1920
HENRY B. SARGENT.....1918-1920
JOHN A. STEVENS.....1918-1920
JOHN R. ALLEN [1].....1920-1921
WILLIAM B. GREGORY [2]....1920-1921
ROBERT H. FERNALD.....1919-1921
EDWARD C. JONES.....1919-1921
LEON P. ALFORD.....1920-1922
JOHN L. HARRINGTON.....1920-1922
ROBERT B. WOLF.....1920-1922
E. A. DEEDS.....1921-1923
ROBERT SIBLEY 1921-1923
L. E. STROTHMAN [3].....1921-1922
A. L. RICE [4].....1922
H. H. VAUGHAN [5].....1923
WALTER S. FINLAY, JR....1922-1924
WM. H. KENERSON.....1922-1924
EARL F. SCOTT.....1922-1924
GEORGE I. ROCKWOOD.....1923-1925
W. J. SANDO.....1923-1925
H. BIRCHARD TAYLOR.....1923-1925
ROBERT W. ANGUS.....1924-1926
SHERWOOD F. JETER.....1924-1926
THOS. L. WILKINSON.....1924-1926
A. G. CHRISTIE.....1925-1927
WM. T. MAGRUDER.....1925-1927
ROY V. WRIGHT.....1925-1927
CHARLES L. NEWCOMB....1926-1928
E. O. EASTWOOD.....1926-1928
EDWARDS R. FISH.....1926-1928
JOHN H. LAWRENCE.....1927-1929
E. A. MULLER.....1927-1929
NEWELL SANDERS 1927-1929
PAUL WRIGHT 1927-1929

Managers

WM. P. TROWBRIDGE
April, 1880-November 1881
THEO. N. ELY
April, 1880-November, 1881
J. C. HOADLEY
April, 1880-November, 1881
WASHINGTON JONES
April, 1880-November, 1881
WM. B. COGSWELL
April, 1880-November, 1882
CHAS. B. RICHARDS
April, 1880-November, 1882
S. B. WHITING
April, 1880-November, 1882
E. D. LEAVITT, JR.
April, 1880-November, 1882
J. F. HOLLOWAY
November, 1880-November, 1883
GEO. W. FISHER
November, 1880-November, 1883
ALLAN STIRLING
November, 1881-November, 1884
GEO. H. BABCOCK
1881-November, 1884
S. W. ROBINSON
1881-November, 1884
JOHN E. SWEET.....1882-1883
ROBT. W. HUNT.....1882-1885
CHAS. T. PORTER.....1882-1885
C. J. H. WOODBURY.....1882-1885
W. F. DURFEE.....1883-1886
OBERLIN SMITH 1883-1886
C. C. WORTHINGTON.....1883-1886
WM. LEE CHURCH.....1884-1887
WM. HEWITT 1884-1887
CHAS. H. MORGAN.....1884-1887
HAMILTON A. HILL.....1885-1888
WILLIAM KENT 1885-1888
SAML. T. WELLMAN.....1885-1888
JOHN T. HAWKINS.....1886-1889
FREDK. G. COGGIN.....1886-1889
THOS. R. MORGAN, SR.....1886-1889
STEPHEN W. BALDWIN....1887-1890
FREDK. GRINNELL.....1887-1890
MORRIS SELLERS 1887-1890
FRANK H. BALL.....1888-1891
GEO. M. BOND.....1888-1891
WM. FORSYTH 1888-1891
JAS. E. DENTON.....1889-1892
CARLETON W. NASON.....1889-1892
H. H. WESTINGHOUSE.....1889-1892
ANDREW FLETCHER 1890-1893
WORCESTER R. WARNER...1890-1893
COLEMAN SELLERS, JR....1890-1893

[1] Deceased, October 26, 1920.
[2] Elected to fill unexpired term of John R. Allen.
[3] Deceased, May 8, 1922.
[4] Elected to fill vacancy caused by death of L. E. Strothman.
[5] Elected to complete term of L. E. Strothman, deceased.

JAS. M. DODGE.....1891-1894
ROBT. FORSYTH 1891-1894
JESSE M. SMITH.....1891-1894
JOHN THOMPSON 1892-1895
CHARLES W. PUSEY.....1892-1895
CHARLES H. MANNING....1892-1895
JOHN B. HERRESHOFF.....1893-1896
LEBBEUS B. MILLER.....1893-1896
WALTER S. RUSSEL.....1893-1896
CHARLES A. BAUER.....1894-1897
ARTHUR C. WALWORTH....1894-1897
JOHN C. KAFER.....1894-1897
GEO. W. DICKIE.....1895-1898
E. D. MEIER.....1895-1898
NORMAN C. STILES.....1895-1898
A. WELLS ROBINSON.....1896-1899
H. S. HAINES.....1896-1899
G. C. HENNING.....1896-1899
J. B. STANWOOD.....1897-1900
H. H. SUPLEE.....1897-1900
GEO. RICHMOND 1897-1900
EDGAR C. FELTON.....1898-1901
A. M. GOODALE.....1898-1901
RICHARD H. SOULE.....1898-1901
FRANCIS H. BOYER.....1899-1902
JOHN A. BRASHEAR.....1899-1902
ALFRED H. RAYNAL.....1899-1902
W. F. M. GOSS.....1900-1903
D. S. JACOBUS.....1900-1903
DE COUREY MAY.....1900-1903
CHARLES H. CORBETT.....1901-1904
H. A. GILLIS.....1901-1904
R. S. MOORE.....1901-1904
ROBT. C. MCKINNEY.....1902-1905
NEWELL SANDERS 1902-1905
S. S. WEBBER.....1902-1905
JOHN W. LIEB, JR.....1903-1906
ASA M. MATTICE.....1903-1906
GEO. I. LOCKWOOD.....1903-1906
GEORGE M. BRILL.....1904-1907
FRED J. MILLER.....1904-1907
RICHARD H. RICE.....1904-1907
WALTER LAIDLAW 1905-1908
FRED. M. PRESCOTT.....1905-1908
FRANK G. TALLMAN.....1905-1908
G. M. BASFORD.....1906-1909
ANDREW J. CALDWELL.....1906-1909
ANDREW L. RIKER.....1906-1909
WM. L. ABBOTT.....1907-1910
ALEX C. HUMPHREYS.....1907-1910
HENRY G. SCOTT.....1911-1912
H. L. GANTT.....1908-1911
I. E. MOULTROP.....1908-1911
W. J. SANDO.....1908-1911
J. SELLERS BANCROFT.....1909-1911
JAMES HARTNESS 1909-1912
H. G. REIST.....1909-1912
HENRY G. STOTT.....1911-1912
D. F. CRAWFORD.....1910-1913
STANLEY G. FLAGG, JR....1910-1913
E. B. KATTE.....1910-1913
CHARLES J. DAVIDSON.....1911-1914
HENRY HESS 1911-1914
GEORGE A. ORROK.....1911-1914
ALFRED NOBLE 1912-1914
MORRIS L. COOKE.....1914-1915
W. B. JACKSON.....1912-1915
H. M. LELAND.....1912-1915
ARTHUR M. GREENE, JR....1913-1916
JOHN HUNTER 1913-1916
ELLIOTT H. WHITLOCK....1913-1916
CHARLES T. MAIN.....1914-1917
SPENCER MILLER 1914-1917
MAX TOLTZ 1914-1917
JOHN H. BARR.....1915-1918
H. DE B. PARSONS.....1915-1918
JOHN A. STEVENS.....1915-1918
ROBERT H. FERNALD.....1916-1919
WILLIAM B. GREGORY.....1916-1919
C. R. WEYMOUTH.....1916-1919
FRED A. GEIER.....1917-1920
FRED N. BUSHNELL.....1917-1920
D. ROBERT YARNALL.....1917-1920
CHARLES L. NEWCOMB....1918-1921
CHARLES RUSS RICHARDS..1918-1921
FRANK O. WELLS.....1918-1921
ELBERT C. FISHER.....1919-1922
EARL F. SCOTT.....1919-1922
DEXTER S. KIMBALL.....1919-1921
L. C. NORDMEYER.....1920-1923
HENRY M. NORRIS.....1920-1923
CARL C. THOMAS.....1920-1923
SHERWOOD F. JETER.....1921-1924
HORACE P. LIVERSIDGE....1921-1924
HOLLIS P. PORTER.....1921-1924
A. G. CHRISTIE.....1922-1925
JAMES H. HERRON.....1922-1925
ROY V. WRIGHT.....1922-1925
E. O. EASTWOOD.....1923-1926
E. R. FISH.....1923-1926
FRANK A. SCOTT.....1923-1926
JOHN R. LAWRENCE.....1924-1927
EDWARD A. MULLER.....1924-1927
PAUL WRIGHT 1924-1927
ROBT. L. DAUGHERTY.....1925-1928
WM. ELMER 1925-1928
CHAS. E. GORTON.....1925-1928
PAUL DOTY 1926-1929
RALPH E. FLANDERS.....1926-1929
CONRAD N. LAUER.....1926-1929
FREDERICK H. DORNER....1927-1930
WILLIAM A. HANLEY.....1927-1930
L. B. MCMILLAN.....1927-1930

Treasurers

LYCURGUS B. MOORE.....April, 1880—December, 1881
CHAS. W. COPELAND.....December, 1881—November, 1884
WILLIAM H. WILEY.....1884—1925
ERIK OBERG.....1925—date

Secretaries

SAM S. WEBBER, JR.....Secretary organization meeting.....1880
LYCURGUS B. MOORE.....Acting Secretary.....April—November 1880
THOS. WHITESIDE RAE.....November, 1880—March, 1883
FREDERICK R. HUTTON.....1883—1906
CALVIN W. RICE.....1906—date

MEMBERSHIP OF THE SOCIETY
1927

Summary of Membership by Residence

United States and Possessions

Alabama	108	Nebraska	28
Alaska	1	Nevada	2
Arizona	17	New Hampshire	40
Arkansas	15	New Jersey	1200
California	871	New Mexico	2
Canal Zone	5	New York	4468
Colorado	77	North Carolina	90
Connecticut	595	North Dakota	4
Delaware	72	Ohio	1029
District of Columbia	180	Oklahoma	86
Florida	97	Oregon	69
Georgia	135	Pennsylvania	1935
Hawaiian Islands	19	Philippine Islands	24
Idaho	7	Porto Rico	25
Illinois	1060	Rhode Island	154
Indiana	260	South Carolina	28
Iowa	46	South Dakota	7
Kansas	55	Tennessee	91
Kentucky	57	Texas	156
Louisiana	107	Utah	32
Maine	36	Vermont	34
Maryland	182	Virginia	115
Massachusetts	1134	Washington	118
Michigan	531	West Virginia	47
Minnesota	103	Wisconsin	355
Mississippi	12	Wyoming	9
Missouri	313		
Montana	17	Total	16260

Other Countries

North America		
Canada	234	
Newfoundland	1	
Mexico	35	
		270
Central America		
Costa Rica	4	
Guatemala	1	
Honduras	1	
Salvador	1	
		7
West Indies		
Cuba	55	
Dominican Republic	6	
Jamaica	3	
		64
South America		
Argentina	20	
Brazil	16	
Chile	22	
Colombia	3	
Ecuador	1	
Peru	1	
Uruguay	1	
Venezuela	5	
		69
Africa		
Canary Islands	1	
Egypt	1	
Union of S. Africa	13	
		15
Asia		
China	23	
Dutch East Indies	1	
India	35	
Japan	24	
Manchuria	1	
Persia	1	
Siam	1	
Straits Settlements	2	
		88
Australasia		
Australia	20	
New Zealand	2	
Tasmania	1	
		23
Europe		
Austria	1	
Belgium	3	
Czechoslovakia	7	
Denmark	8	
Finland	3	
France	34	
Germany	25	
Great Britain	100	
Greece	2	
Holland	3	
Italy	6	
Lithuania	1	
Norway	2	
Poland	5	
Roumania	1	
Russia	2	
Spain	8	
Sweden	11	
Switzerland	9	
Turkey	2	
		233
Total		769

Membership in United States	16260
Membership in Other Countries	769
Present Address Unknown	7
Total Membership	17036

Summary of Membership by Grades

Honorary Members	21
Members	8136
Associates	641
Associate Members	3978
Juniors	4260
Total	17036

Index to Papers and Reports

THE following index covers, first, all papers presented during 1927 at the Spring, Annual, Regional, National, and Local Section meetings which have been published, either in *Mechanical Engineering* or the various sections of Transactions, or are definitely scheduled for publication subsequent to the issue of this volume; second, reports for 1927 of the Professional Divisions and Executive Committee of the Steam Table Fund, published in *Mechanical Engineering;* and third, codes and standards of the Boiler Code, Power Test Code, Research, Safety Code, and Standardization Committees, published during 1927 either in *Mechanical Engineering* or in pamphlet form.

Each paper, under the name of its author, and each report, under the name of the group which prepared it, is briefly abstracted, and all papers and reports thoroughly cross-referenced.

The following abbreviations are used to conserve space: *Mechanical Engineering,* M.E.; Section of Transaction, Sec. Trans.

INDEX TO PAPERS AND REPORTS

Abbreviations and symbols, scientific and engineering, standardization of. See Standardization of scientific, etc.

Accidents, causes of. See Carrow, Thomas H.

Accidents, industrial. See Wallace, L. W.

Accidents, responsibility for. See Carrow, Thomas H.

Adams, T. S. The Relation between Industry and Taxation, M.E., Feb. 1928, p. 113. Considering both what should and can be accomplished in the field of taxation in the next ten years, author believes that American industry could do nothing more helpful to itself and to the public than to work vigorously through some specialized agency, representing all branches of business enterprise, for the simplification of tax laws and the improvement of administrative personnel. Third Henry Robinson Towne lecture.

Aerodynamic safety in aviation. See Guggenheim, Harry F.

Aeronautics, progress in. M.E., Jan. 1928, p. 48. Progress report of A.S.M.E. Aeronautics Division, outlining developments during 1927.

Agricultural machinery. See Zimmerman, O. B.

Air compressors, indicators for. See Jacklin, H. M.

Air filter, Owens automatic. See Moore, George T.

Air flow, measurement with nozzles. See Moss, Sanford A.

Air-preheater applications, economics of. See Van Deventer, F. M.

Aircraft, oleo gears for. See Aldrin, E. E.

Aircraft construction materials, subjection to high temperatures. See Johnson, J. B.

Aircraft engines, metallurgy of. See Clements, Bishop.

Airplane engines, light supercharged Diesel. See Sperry, Elmer A.

Airplanes, design. See Clark, V. E.

Airport, Buffalo. See Satterfield, John M.

Aisenstein, M. D. A New Method of Separating the Hydraulic Losses in a Centrifugal Pump. Hydraulic Sec. Trans., Jan.-Apr. 1928. Particulars of method by means of which friction and shock losses of a given centrifugal pump may be determined separately from its head-capacity curve, with illustrative example.

Alden, Vern E. Present Tendencies of Steam-Station Design. M.E., June 1927, p. 603. Improvements since 1913; higher steam pressures and temperatures; use of economizers; effect of stage bleeding for feedwater heating on turbine design; use of air preheaters; furnace design; improved methods of burning coal; increase in size of equipment; future possibilities.

Aldrin, E. E. Oleo Gears for Aircraft. Aeronautics Sec. Trans., Jan.-Apr. 1928. Description of oil-damping devices for reducing landing shocks of airplanes and theory and test data for design of gravity-return type of oleo landing gear.

American Engineering Council, study of accidents and production. See Wallace, L. W.

American fuel resources. See Hood, O. P.

A.S.M.E. Boiler Code. See Boiler Code.

A.S.M.E. Power Test Codes. See Power Test Code.

A.S.M.E. Professional Divisions, Reports of. See Professional Division Progress Reports for 1927.

A.S.M.E. Research reports. See Research.

A.S.M.E. Standardization reports. See Standardization.

Anti-friction bearings, application to machine tools. See Runge, R. F.

Anti-friction bearings in ordnance work. See Brauer, F.

Apprentices, training of, draftsmen. See Freund, C. J.

Apprentices, training of, organization for. See Moffatt, Ben. S.

Apprentices, training of, railway. See Thomas, F. W.

Apprenticeship certificates, uniform. See Conant, Wm. S.

Arc welding. See Lincoln, J. F.

Armature bearings, waste-packed. See Karelitz, G. B.

Arthur, William. Diesel Traction for Railroads. M.E., vol. 49, Mid-May 1927, p. 581. A general discussion, covering advantages of "Dieselizing" certain railroad services; operating, design, and construction problems; weights and speeds; cooling, transmission, and vibration problems; maintenance; fuel consumption. Favors adoption of Diesel-electric traction.

Ashman, Geo. H. Plant Maintenance. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Methods of the General Electric Co. at Schenectady, N. Y. Buildings; machinery; power, heat, and light; die, pattern, and jig work; transportation; safety devices.

Atmospheric pollution, measurement of. See Moore, George T.

Atmospheric smoke pollution, effect of. See Langsdorf, A. S.

Automatic combustion control. See Peebles, T. A.

Automobile engines, wristpins, stresses and strains in. See Collier, Guy B.

Aviation, aerodynamic safety in. See Guggenheim, Harry F.

Azbe, Victor J. Industrial Furnaces. M.E., Oct. 1927, p. 1079. Importance of relative temperatures of heat-radiating and heat-absorbing media; effects on efficiency of low CO_2 and excess air; cost of steam for blowing.

Azbe, Victor J. Smokeless and Efficient Firing of Domestic Furnaces. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Presentation of data of tests conducted over a period of two years on firing of domestic furnaces. Outlines a new method of firing practically smokeless and quite efficient, accomplished by slight changes of furnace design and applicable to existing furnaces.

B

Badger, W. L. Power Plant Make-Up Evaporators. To be published, Fuels & Steam Power Sec. Trans., 1928. General discussion of evaporator types and evaporator operation as they would be involved in the production of relatively large amounts of boiler feed make-up. Factors affecting rates of heat transfer, general problem of foam and entrainment, and basic principles of multiple effect operation.

Bailey, Alex D. High Steam Pressure and Temperature at Crawford Avenue Station. To be published, Fuels & Steam Power Sec. Trans., 1928. Problems encountered in operation of Crawford Avenue Station of Commonwealth Edison Company, designed for 550 lb. steam pressure at the turbines and 725 deg. fahr. temperature.

Bailey, E. G. Some Factors in Furnace Design for High Capacity. M.E., Dec. 1927, p. 1300. Description of various modern boiler furnaces designed for operation at high capacity and of the factors involved in controlling furnace design.

Balsa wood, compressive tests on. See Stang, A. H.

Barometers. See Power test code on instruments and apparatus.

Beardsley, Edward G. The Study of Oil Sprays for Fuel-Injection Engines by Means of High-Speed Motion Pictures. Oil & Gas Power Sec. Trans., Jan.-Apr. 1928. Describes apparatus developed in laboratory at Langley Field for recording photographically the start, growth, and cut-off of oil sprays from injection valves.

Bearings, anti-friction, application to machine tools. See Runge, R. F.

Bearings, anti-friction, in ordnance work. See Brauer, F.

Bearings, armature, waste-packed. See Karelitz, G. B.

Bearings, journal, effect of running in on performance of. See McKee, S. A.

Bearings, roller, for railway cars. See Sanders, Walter C.

Beebee, A. M. Economics of Dry-Quenching Coke by the Sulzer Process. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Describes installation of Sulzer process of dry-quenching coke at plant of Rochester Gas & Elec. Corp. Results of operation. Comparison with other plants employing other systems as to efficiency, ease of operation, quality of product, labor requirements, etc.; great flexibility and ease of control pointed out.

Beet-sugar manufacture. See Cannon, W. Y.

Bell, Landon C. Material Handling between Stump and Board. M.E., vol. 49, Mid-May 1927, p. 503. Processes employed in Appalachian Mountain hardwood section, where problems are different from those encountered in lowland and swamp logging. Logging railroads; felling trees; "ballhooting"; skidding; loading log trains; log ponds; handling in the mill; piling and stacking; loading lumber on cars; etc.

Bell, M. D. Mechanical Engineering in Flour-Mill Operation. M.E., Oct. 1927, p. 1125. Brief account of mechanical engineer's relations to and accomplishments in the milling industry.

Beury, William. The Preparation of Coal with Special Reference to Quality. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Conditions encountered by miners, and methods employed to produce a product of maximum quality described. Description of modern mine and preparation plant given.

Bibliography on lubrication research. See Lubrication research, bibliography on.

Bibliography on mechanical springs. See Research on mechanical springs.

Big Creek Power Plant No. 2, Southern Calif. Edison Co., penstock of. See Cox, John L.

Biggert, F. C., Jr. Developments in 4-High Rolling Mills. Iron & Steel Sec. Trans., Jan.-Apr. 1928. Rolling of wide and thin material; early mills and experimental designs; technical features of mills; capacity and power consumption.

Bituminous-coal preparation in Eastern fields. See Wadleigh, F. R.

Boiler Code Interpretations. A.S.M.E. Boiler Code Committee Work. M.E., 1927, Jan., p. 61; Feb., p. 179; May, p. 471; June, p. 694; July, p. 825; Aug., p. 925; Sept., p. 1034; and Nov., p. 1253.

Boiler Code Public Hearing. Public Discussion on Dished-Head Construction. M.E., June 1927, p. 636. Discussion at public hearing on Mar. 17, 1927, of papers presented at joint meeting of Metropolitan Sections of A.S.M.E. and American Welding Society on Jan. 4, 1927, and general discussion of problem of dished-head design.

Boiler Code Revisions and Addenda. A.S.M.E. Boiler Code Committee Work. Revisions and Addenda to Boiler Construction Code. M.E., 1927, Mar., p. 278; Aug., p. 929; Sept., p. 1031; and Oct., p. 1141.

Boiler construction, dished-head. See Boiler Code public hearing.

Boiler feedwater, treatment. See Powell, Sheppard T.

Boiler-furnace refractories. See Research on boiler-furnace refractories.

Boiler furnaces, design of. See Bailey, E. G.

Boiler plants, pulverized-coal burning in. See Kreisinger, Henry, and Purcell.

Boilers and furnaces, Charles R. Huntley station. See Cushing, H. M. and Moore.

Boilers, direct-fired powdered-fuel. See Cushing, H. M., and Moore.

Boilers, dished and flanged heads of. See Kinzel, A. B.

Boilers, modern, characteristics of. See Fish, E. R.

Boilers, operation. See Turner, Charles F.

Bolt, nut and rivet proportions. See Standardization of bolt, nut and rivet proportions.

Bolts, round unslotted head, standardization of. See Standardization of bolt, nut, and rivet proportions.

Brass mill, production control in. See Clark, W. R., and Brewer.

Brauer, F. Anti-Friction Bearings in Ordnance Work. M.E., Sept. 1927, p. 959. Rapid and easy manipulation of heavy ordnance made possible by use of ball and roller bearings; some designs for heavy-load conditions.

Brewer, Arthur. See Clark, W. R., and Brewer.

Brick kilns, use of fuels in. See Rice, W. E.

Bridges, railway, vibration of. See Timoshenko, S.

Brillo-Field automatic machine, steel-wool industry. See Field, Crosby.

Brooklyn Edison Company, electrical system of. See Stahl, E. C. M.

Brooklyn Edison Company, Hudson Ave. Station. See Holmes, W. C.

Brooklyn Edison Company, methods of obtaining economical system operation. See Cook, H. M.

Brooklyn Edison Company, power generation. See Houghton, Bert.

Brooklyn Edison Company, system operation of steam and mechanical equipment. See Cox, H. A.

Budgetary control. See Coes, H. V.; Jordan, J. P.

Buffalo airport, development of. See Satterfield, John M.

Buildings, design, relation to manufacturing. See Wood, Charles P.

Bureau of Standards, steam table research at. See Steam table research, progress at Bureau of Standards.

Burning of liquid fuel. See Peabody, Ernest H.

Bus bodies, static loads upon. See Norris, Charles B., and Potchen.

Buzzo, Joseph T. Sugar-Warehouse Conveying Systems. Materials Handling Sec. Trans., Jan.-Apr. 1928. Describes conveying equipment installed at Crockett, Calif., plant of California & Hawaiian Sugar Refining Corp. Various types of conveyors, their duties, maintenance, and operating costs.

C

Calhoun, F. B. Production Control Methods in the Rubber Industry. Management Sec. Trans., Jan.-Apr. 1928. Statement of the system employed in the Akron, Ohio, plants of the Goodyear Tire & Rubber Co. Relationship developed between departments handling different types of work. Output based on market demand through direct contact between sales and production departments.

Cannon, W. Y. Beet-Sugar Manufacture. M.E., Sept. 1927, p. 1006. Early history of beet-sugar industry; sugar yields per ton of beets; processes in common use; steps in manufacture; by-products; recovery of sugar from molasses; beet-sugar factory equipment and facilities of maintenance.

Carbonization, low-temperature, K.S.G. process. See Runge, Walter.

Carrow, Thomas H. Can Accident Prevention Be Reduced to a Science? To be published, Railroad Sec. Trans., 1928. The conclusion, in the affirmative, is based on an analysis of the causes of accidents. Need for complete accidents records and for education of supervisory forces as to responsibility for accidents.

Cars, passenger, heating and ventilating. See Russell, Edward A.

Cars, passenger, roller bearings for. See Sanders, Walter C.

Carter, Emmett B. An Industrial Plant Location Study. Management Sec. Trans., 1928. Factors to be considered in locating plant include trade possibilities for expansion; low distribution costs and speedy delivery; cost and quality of raw materials; first cost of plant and resulting overhead costs; cost and quality of labor. Statistics for various localities.

Cedar Creek hydroelectric station. See Lee, W. S.

Central stations, Brooklyn Edison Company. See Cook, H. M.; Cox, H. A.; Holmes, W. C.; Houghton, Bert; Stahl, E. C. M.

Central stations, Edgar Station. See Moultrop, I. E. and Norris.

Centrifugal fans, effect of entrance and discharge angles on performance of. See Wilson, Georges Samuel, Dudley, and McIntyre.

Centrifugal pumps, performance curves of. See Lichtenstein, Joseph.

Centrifugal pumps, separating hydraulic losses in. See Aisenstein, M. D.

Centrifugal pumps. See also Davey, H. T.

Chapman, Wm. B. Progress in Gas-Producer Practice. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Traces development of gas producers, giving a review of the growth of industries in which such equipment is used, and discusses reasons for the adoption of improvements and the effects produced by their use.

Chapman, W. H. Plant Maintenance and Return on Capital Investment. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Twelve items of the fundamental economies of plant maintenance discussed in detail.

Characteristics of modern boilers. See Fish, E. R.

Characteristics of modern stokers. See Daniels, F. H.

Charters, D. B. Coordinating Wage Incentives and Production Control. Management Sec. Trans., Jan.-Apr. 1928. Short account of various methods tried in East Pittsburgh works of Westinghouse Elec. & Mfg. Co., together with description of plan finally adopted and now in use.

Charts, tolerance and allowance, for metal fits. See Standardization of plain limit gages, etc.

Chwang, C. T. See Ellenwood, F. O., Evans, and Chwang.

Clark, C. L. See White, A. E., and Clark.

Clark, V. E. Apparent Present Tendencies in Airplane Design. M.E., Aug. 1927, p. 727. Brief review of recent developments and practice in various countries, pointing out successful results obtained with designs of widely different types.

Clark, W. R., and Brewer, Arthur. Production Control in a Wrought-Brass Mill. To be published, Management Sec. Trans., 1928. Description of a scheduling system which has worked out satisfactorily during the past few years in a brass mill, and which has for its object better service, reduced inventories, and stabilized employment.

Clay slurry, pumping through four-inch pipe. See Gregory, W. B.

Clements, Bishop. Metallurgy of Aircraft Engines. Aeronautic Sec. Trans., Jan.-Apr. 1928. Materials for aircraft engines which will give a dependable and efficient engine with lowest possible weight per horsepower.

Cleveland, smoke-abatement in. See Whitlock, Elliott H.

Clinkering of coal ash as related to laboratory fusibility determinations. See Fieldner, A. C., Selvig, and Nicholls.

Coal, bituminous, preparation. See Wadleigh, F. R.

Coal, carbonization, economics of. See Orrok, Geo. A.

Coal, carbonization, low-temperature. See Runge, Walter.

Coal, distillation, low-temperature. See Runge, Walter.

Coal, Mid-Western, burning. See McDonald, E. L.

Coal, powdered, application to small boilers of industrial plants. See Kreisinger, Henry.

Coal, purchase of. See Smith, Morgan B.

Coal, quality preparation of. See Beury, William.

Coal ash, clinkering of, as related to laboratory fusibility determinations. See Fieldner, A. C., Selvig, and Nicholls.

Coal mines, mechanical loading in. See McCullough, H. F.

Coes, H. V. Some Essential Principles for Budgetary Control. M.E., Feb. 1928, p. 143. Presentation in condensed form of essential principles for application of budgeting to a business and the effective means for control.

Coke, dry-quenching, by Sulzer process. See Beebee, A. M.

Coke, production and use in blast furnaces. See Orrok, Geo. A.

Coke ovens, types. See Orrok, Geo. A.

Collier, Guy B. Analysis of Strains and Stresses in a Wristpin. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. An application of the mathematical theory of elasticity to strains and stresses in a wristpin of an automobile engine. Shows that wristpins can be made considerably lighter than in present-day practice and still have requisite strength.

Collins, F. S. Characteristics of High-Pressure Power-Station Design in the Middle West. M.E., Aug. 1927, p. 759. Study of main factors to be considered in design of modern power station in Middle West, and problems as solved in various stations.

Combustion and heat transfer. See Haslam, R. T., and Hottel.

Combustion, automatic, control of. See Peebles, T. A.

Commonwealth Edison Company, Crawford Avenue Station. See Bailey, Alex D.

Conant, Wm. S. A Uniform Apprenticeship Certificate for Cooperating Groups of Employers. M. E., vol. 49, Mid-May 1927, p. 547. Urges all companies and schools engaged in industrial-education work to cooperate toward securing greater uniformity in training for each trade, and a more explicit statement of accomplishment in the certificates awarded.

Condensers, surface, in steam power plants. See Powell, J. A., and Vetlesen, H. J.

Conduits, penstocks, tests of. See Cox, John L.

Conduits, water hammer in. See Quick, Ray S.

Conference method of foremanship training. See Klinefelter, C. F.

Conveyors, coal mine. See McCullough, H. F.

Conveyors, sugar warehouse. See Buzzo, Joseph T.

Cook, H. M. Methods of Obtaining Economical System Operation. M.E., Apr. 1927, p. 313. Division-of-load report and its compilation; determining performance; daily performance reports; accurate station instruments a prime necessity; lowest overall system economy the desideratum. Methods employed by Brooklyn Edison Company.

Cooke, Morris L. Morale as a Factor in Time-Study Technique. M.E., June 1927, p. 595. Illustrated by a recent investigation of the production standards used in the garment industry in Cleveland, Ohio.

Copper tubes, extruded, manufacture and application of. See Foisy, Geo. A.

Cost determination, materials handling equipment. See Hagemann, George E.

Cost purchase quantities, minimum. See Davis, R. C.

Cox, E. R. General Heat-Transfer Formulas. Petroleum Sec. Trans., Jan.-Apr. 1928. A set of general equations involving the film concept of heat-transfer and of convenient form for use in the practical design of heat-transfer apparatus. Bibliography.

Cox, H. A. System Operation of Steam and Mechanical Equipment. M.E., Apr. 1927, p. 310. Division of load; selection of fuel; operation changes; maintenance procedure. System used by Brooklyn Edison Company.

Cox, John L. Destruction Test of a 66-In. Forged Steel Penstock Pipe. M.E., Dec. 1927, p. 1307. Particulars and results of test of a representative portion of one section of the penstock of the Big Creek Power Plant No. 2 of the Southern California Edison Co., with object of determining elastic limit and ultimate strength, as well as deformation and behavior under high pressure.

Cranes, cargo. See Dunell, Bernard.

Crawford Avenue Station, Commonwealth Edison Company. See Bailey, Alex D.

Crockett, C. B., and Payne, H. J. Operating Costs of Electric Industrial Trucks and Tractors. Materials Handling Sec. Trans., Jan.-Apr. 1928. Shows how direct and indirect costs of materials-handling system may be classified and estimated, and how to apply the methods described to the question of operation of electric trucks. Factors affecting costs, and cost of operation in several plants, showing savings obtained.

Curtis, Myron S. The Economics of Machine-Tool Replacement. M.E., Sept. 1927, p. 966. Present market conditions and tendencies in machine-tool design; comparison of new with former types of machine tools and savings effected by replacements.

Cushing, H. M., and Moore, R. P. Direct-Fired Powdered-Fuel Boilers with Well-Type Furnaces at Charles R. Huntley Station. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Paper describes the evolution of the furnace design, gives reasons for the selection of pulverized coal, and the adoption of the direct-fired system. Presents operating results. Tests embodied in the paper show unit efficiencies in excess of 85 per cent within the operating range of the equipment — from 125 per cent to 550 per cent of rating of boiler and walls.

Cutting tools, hydraulic feed for. See Ferris, Walter.

Cylinders, Diesel-engine, lubricating. See Northcutt, W. O.

D

Daniels, F. H. The Characteristics of Modern Stokers. M.E., Oct. 1927, p. 1076. Characteristics demanded of modern stokers and way in which these requirements are met by travelling-grate and multiple-retort underfeed types. Air control along length of retort and duplex firing of multiple-retort underfeed stokers.

Davey, H. T. Centrifugal Pumps. Hydraulic Sec. Trans., Jan.-Apr. 1928. General consideration regarding losses, disk friction, specific speed; principles governing design of volute, suction and delivery pipes, impeller, bearings and glands, priming apparatus, valves; materials used in construction of pumps for various purposes.

Davey, Wheeler P. X-Ray Examination of Structural Materials. M.E., Mar. 1928, p. 213. X-ray has become tool of considerable usefulness to mechanical engineers, not only in explaining facts previously known, but also in clarifying knowledge of structural materials, thus paving the way for the development of still additional materials to meet new requirements.

Davis, Harvey N. Steam table research. See Steam table research, progress at Harvard University.

Davis, R. C. Determination of Mimimum Cost Purchase Quantities. Management Sec. Trans., Jan.-Apr. 1928. Development of a formula that considers all the factors covering cost of purchases.

Defense, national, industrial mobilization for. See Schwab, Charles M.

Den Hartog, J. P. Vibration of Frames of Electrical Machines. To be published, Applied Mechanics Sec. Trans., 1928. Formulas and curves for calculating natural frequency of vibration. It is shown that frame, which usually omits large portion of total noise, can in many cases be regarded as a part of a ring with rigid ends.

Diesel engines, efficiencies of. See Ellenwood, F. O., Evans, and Chwang.

Diesel engines for locomotives. See Hildebrand, R.

Diesel engines, high-speed, combustion-chamber design. See Kemper, Carlton.

Diesel engines, light supercharged, for use in air service. See Sperry, Elmer A.

Diesel engines, lubricating power cylinders. See Northcutt, W. O.

Diesel traction for railroads. See Arthur, William.

Dished-head boiler construction. See Boiler Code public hearing.

Divine, Bradford H. The Prerequisites of Successful Polishing. M.E., Sept. 1927, p. 975. Conditions which must be obtained in polishing department to procure highest quality of work with least cost of material and wages.

Draft gears, railway, development and testing of. See Stuebing, A. F.

Draftsmen, training for. See Freund, C. J.

Drilling machines, hydraulic feed for. See Galloway, R. M.

Drills and pumps, oil industry. See McConnell, Glenver.

DuBrul, E. F. Machinery's Contribution to Wealth and Welfare. M.E., July 1927, p. 755. Increase of production brought about mainly through the successful transfer of skill and intelligence from man to machine; underlying importance of machine-tool-building industry in our mechanized world warrants a larger share of prosperity for it than it now receives.

Dudley, William Lyle. See Wilson, Georges Samuel, Dudley, and McIntyre.

Dunell, Bernard. Cargo Cranes — Types Available, Factors Governing Selection, and Latest Developments. Materials Handling Sec. Trans., Jan.-Apr. 1928. Discusses handling of bulk and general cargo between docks and ships, and various types of cranes used.

Dunn, Gano. Management's Contribution to Prosperity in Industry. M.E., Dec. 1927, p. 1285. Joy in work and support of pure science are, in author's conception, two of Management's most important possible contributions to prosperity in industry.

E

Economics of air-preheater applications. See Van Deventer, F. M.

Economics of machine-tool replacement. See Curtis, Myron S.

Edgar Station, Edison Electric Illuminating Company. See Moultrop, I. E., and Norris.

Edison Electric Illuminating Company, Edgar Station. See Moultrop, I. E., and Norris.

Education for foremanship. See Moyer, James A.

Education, engineering, engineering societies and. See Wickenden, W. E.

Education, industrial, certificates for. See Conant, Wm. S.

Education, industrial, General Motors Institute of Technology. See Sobey, Albert.

Education, industrial, Henry Ford Trade School. See Searle, Frederick, E.

Education, industrial. See also Moffatt, Ben. S.; Walker, P. F.

Eidmann, Frank L. Materials Handling as an Aid to Production. Materials Handling Sec. Trans., Jan.-Apr. 1928. Materials-handling problem surveyed from eight angles; examples of good and bad practice quoted, with illustrations of some.

Einstein, S., and Ernst, H. Hydraulic Feeding Mechanism for Milling Machines. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Brief history of development of hydraulic feed mechanisms and description of one which authors believe meets conflicting requirements of milling machine.

Elasticity, theory of applied to wristpins. See Collier, Guy B.

Electric generators, windmill-driven. See Fales, E. N.

Electric trucks and tractors, operating costs of. See Crockett, C. B., and Payne.

Electric welding, arc. See Lincoln, J. F.

Electrical machines, vibration of frames. See Den Hartog, J. P.

Electrical system of Brooklyn Edison Company. See Stahl, E. C. M.

Electricity, applications of, petroleum industry. See McCargar, D. M.

Elevators, grain, fires in. See Hoxie, F. J.

Ellenwood, F. O.; Evans, F. C.; and Chwang, C. T. Efficiencies of Otto and Diesel Engines. Oil & Gas Power Sec. Trans., Jan.-Apr. 1928. Results, presented in curves and tables, of calculations for ideal Otto and Diesel engines in which the working substance is a mixture of real gases.

Employment, stabilized, in wrought-brass mill. See Clark, W. R., and Brewer.

Engineering education, engineering societies and. See Wickenden, W. E.

Engineers, as managers of industrial power. See Scott, Henry F.

Engines, aircraft, metallurgy of. See Clements, Bishop.

Engines, Diesel, light supercharged for use in air service. See Sperry, Elmer A.

Engines, oil, high-speed. See Shepherd, H. F.

Ernst, H. See Einstein S., and Ernst.

Evans, F. C. See Ellenwood, F. O., Evans, and Chwang.

Evaporators, power-plant make-up. See Badger, W. L.

Executives, as managers of industrial power. See Polakov, Walter N.

Executives, automobile industry, training of. See Sobey, Albert.

Expansion pipe bends, stresses and reactions in. See Wahl, A. M.

Explosions, flour mills and grain elevators. See Hoxie, F. J.

Extrusion of metals. See Foisy, Geo. A.

F

Factories, control of overhead in. See Perkins, H. G.

Fales, E. N. A New Propeller-Type, High Speed Windmill for Electric Generation. M.E., Dec. 1927, p. 1309. Wind-tunnel and other tests of new windmill described; a study of velocity and prevalence of winds at Dayton, with explanation of how conclusions may be adapted to other localities.

Falk Corporation plan of training draftsmen. See Freund, C. J.

Fans, centrifugal, effect of entrance and discharge angles on performance of. See Wilson, Georges Samuel, Dudley, and McIntyre.

Ferris, Walter. Characteristics of Hydraulic Feed and Drive for Cutting Tools. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. General principles of hydraulic devices used for driving or feeding apparatus for machine tools, with particular reference to control of speed and inertia forces.

Ferrous metals, properties at high temperatures. See White, A. E., and Clark.

Field, Crosby. The Steel-Wool Industry. M.E., Dec. 1927, p. 1315. Traces development of steel-wool industry. Describes various machines and processes. Compares Brillo-Field automatic machine with shaving-block type of machine.

Fieldner, A. C., Selvig, W. A., and Nicholls, P. The Clinkering of Coal Ash as Related to Laboratory Fusibility Determinations. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Investigation on twenty-one coals, ranging in ash fusibility from 1990 to 2930 deg. fahr., as to composition, distribution, and fusibility of ash; clinkering characteristics of these coals as observed in a specially designed hand-fired furnace.

Fiock, E. F. Steam table research. See Steam table research, progress at Bureau of Standards.

Fire engines, modern. See Stinson, Karl W.

Fires, flour mills and grain elevators. See Hoxie, F. J.

Fish, E. R. The Characteristics of Modern Boilers. M.E., Nov. 1927, p. 1175. Traces development of boilers from early installations of small capacity to modern high-pressure types. Methods of construction described, and equipment tending to increase efficiency discussed.

Fittings, pipe. See Standardization of pipe flanges and fittings.

Flanges, pipe. See Standardization of pipe flanges and fittings.

Flour mills, explosions and fires in. See Hoxie, F. J.

Flour mills, operation, mechanical engineering in. See Bell, M. D.

Flow of air and gas, measurement with nozzles. See Moss, Sanford A.

Foisy, Geo. A. The Manufacture and Application of Extruded Copper Tubes. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Brief description of development of extrusion processes, which offer method of manufacturing short lengths of thin-walled copper tubes more economically than

by usual draw-bench method. Various uses of tubes manufactured by extrusion process.

Foremen, training of, conference method. See Klinefelter, C. F.

Foremen, training of. See also Hartley, L. A.; Moyer, James A.

Frames of electrical machines, vibration of. See Den Hartog, J. P.

Freight, L. C. L., and motor trucks. See Scarr, F. J.

Freund, C. J. Apprentice Training for Draftsmen. To be published, M.E., June 1928. Need for cooperation between shop and drafting room; outline of training plan adopted by Falk Corporation and success of plan.

Fry, Lawford H. High Steam Pressures in Locomotive Cylinders. To be published, Railroad Sec. Trans., 1928. Author surveys efficiencies obtainable with various steam pressures, and examines the effect of the ratio of expansion on efficiency. Concludes that it is possible to secure a considerable increase in thermal efficiency of cylinders by increasing boiler pressure.

Fuel, conservation, high cost of. See Trinks, W.

Fuel, liquid, burning of. See Peabody, Ernest H.

Fuel, resources, American. See Hood, O. P.

Fuel, utilization in 1927, progress in. M.E., Jan. 1928, p. 22. Progress report of A.S.M.E. Fuels Division, outlining developments during 1927.

Fuels, colloidal. See Peabody, Ernest H.

Fuels, for brick kilns. See Rice, W. E.

Fuels, past and prospective. See Parr, S. W.

Fuels, solid. See Power test code for solid fuels.

Furnaces and boilers, Charles R. Huntley station. See Cushing, H. M., and Moore.

Furnaces, boiler. See Boiler furnaces.

Furnaces, domestic, firing. See Azbe, Victor J.

Furnaces, industrial. See Azbe, Victor J.

Furniture industry, mass production in. See Richardson, Bayard Edwin.

G

Gages, plain limit, standardization of. See Standardization of plain limit gages, etc.

Galloway, R. M. The Development of Hydraulic Feeds on Multiple Drilling Machines. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Three types of hydraulic pumps used for machine-tool feeds; experiences in adapting hydraulic feed to multiple-spindle drilling machine and success obtained.

Garment industry, time study in. See Cooke, Morris L.

Gas engines, efficiency of. See Ellenwood, F. O., Evans, and Chwang.

Gas flow, measurement with nozzles. See Moss, Sanford A.

Gas lift as applied in oil production. See Lake, F. W.

Gas-producer practice. See Chapman, Wm. B.

Gears, hardened and ground steel. See Research on strength of gear teeth.

Gears, perfect. See Research on strength of gear teeth.

Gears, spur, tooth form. See Standardization of gears.

Gears, standardization of. See Standardization of gears.

Gears, strength of teeth. See Research on strength of gear teeth.

Gears, worm. See Research on worm gears.

General Electric Company, plant maintenance. See Ashman, Geo. H.

General Electric Company, steam table research by. See Steam table research, progress at Schenectady, N. Y.

General Motors Institute of Technology. See Sobey, Albert.

Gotwals, C. S. Maintenance of Shop Equipment. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Methods employed at the Hess-Bright Manufacturing Company, Philadelphia, Pa.

Governors, speed-responsive, engine and turbine. See Power test code for speed-responsive governors.

Graeper, Walter W. Control of Quality. Management Sec. Trans., 1928. Conditions and circumstances affecting control of quality obtaining in the shops of the Bausch & Lomb Optical Co., manufacturers of optical instruments and accessories.

Grain elevators, explosions and fires in. See Hoxie, F. J.

Greene, T. W. Stresses in a Large Welded Tank Subjected to Repeated High Test Pressures. M.E., Jan. 1927, p. 124. Details of test of 5-ft. tank 40 ft. long; measured stresses and strains in various sections of the shell, around the head knuckles and manhole, and in the replaced manhead with ring-reinforced manhole. See also discussion in June issue, p. 636.

Gregory, W. B. Pumping Clay Slurry through a Four-Inch Pipe. M.E., June 1927, p. 609. Results of experiments in pumping clay slurries containing various percentages of solids; friction losses when pumping through pipe; best velocity for pumping; viscosity of slurries.

Grothe, Oscar. Coordinating Wage Incentives and Production Control. Management Sec. Trans., Jan.-Apr. 1928. Outlines principal feature of Bedaux system as used in operation of manufacturing division of White Sewing Machine Corporation.

Guggenheim, Harry F. Importance of Aerodynamic Safety in Aviation. M.E., July 1927, p. 719. What is meant by safety in aviation; flying hazards and how they are being overcome; the Daniel Guggenheim Safe Aircraft Competition and its object; safety tests and demonstrations of competition and basis of award of prize.

Guild, Waldo J. Hydraulics and Modern Machine-Tool Design. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Advantages of incompressible fluids over air; determination of pressure and volume; control devices; application of hydraulic devices to machine tools, with comments on valves employed and on air accumulation in oil lines.

H

Hagemann, George E. How to Determine Expenditures in Material Handling Equipment. Management Sec. Trans., 1928. Paper contains a statement of the principles involved in the problem of economically selecting and using material handling equipment. Also presents a simplification

of the present A.S.M.E. formula. A few representative installations of equipment by the use of this simplified formula are discussed.

Harrison, William R. The Management of Railway Shops and Terminals. M.E., Oct. 1927, p. 1120. Survey of the work which is done at railroad terminal shops and the organization which performs it.

Hartley, L. A. Industrial Problems or Difficulties. M.E., Aug. 1927, p. 893. Author discusses subject of foreman training in experimental stage, and shows progress being made to devise more satisfactory method. Errors of ignoring specific problems, analysis without synthesis, and overemphasizing the foreman's training.

Hartman, Wm. Maintenance of Machine Equipment at the National Cash Register Company's Plant. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Machine-equipment maintenance at plant of National Cash Register Company at Dayton, Ohio, is divided among machine, electrical, millwright, and purchasing departments.

Harvard University, steam table research at. See Steam table research, progress at Harvard University.

Haslam, R. T., and Hottel, H. C. Combustion and Heat Transfer. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Paper discusses those types of heat transmission peculiar to combustion processes. Subjects include radiation from suspended matter in powdered-coal flames, from non-luminous gases, from luminous gas flames, and between finite solid surfaces; simultaneous radiation of gases and suspended solids; application to furnace design of mechanisms described; empirical methods of solution of furnace problems.

Hawthorne Works, Western Elec. Co., development of machine tools for. See Spencer, F. C.

Headgates and racks. See Lee, W. S.

Heat-transfer and combustion. See Haslam, R. T., and Hottel, H. C.

Heat-transfer formulas. See Cox, E. R.

Heating and ventilating, passenger cars. See Russell, Edward A.

Hersey, Mayo D., and Shore, Henry. Viscosity of Lubricants under Pressure. M.E., Mar. 1928, p. 221. An experimental determination of the combined effects of high pressures and temperatures, using the ball-and-slanted-tube type of viscosimeter.

Hess-Bright Mfg. Co. equipment maintenance. See Gotwals, C. S.

High-pressure steam electric station. See Moultrop, I. E., and Norris.

Hildebrand, R. Diesel Engines for Locomotives. Oil & Gas Power Sec. Trans., Jan.-Apr. 1928. Proposes improvement of cylinders of steam locomotives so that they may be used either as steam or Diesel cylinders or as both simultaneously, retaining advantages of both types of engine.

Hockley, C. C. The Pulp and Paper Industry and the Northwest. Wood Industries Sec. Trans., Jan.-Apr. 1928. General review of the industry, particularly that part of it using wood fiber, with its relation to the Northwest, its present extent of production and consumption, and its hopes for the future.

Holmes, W. C. The Operation of the Hudson Avenue Generating Station of the Brooklyn Edison Company. M.E., Apr. 1927, p. 321. Data on section of station employing 300 lb. boiler pressure; layout of No. 4 unit, an 80,000-kw. cross-compound machine; operation of 300-lb. section units; auxiliary drives; operating results on 300-lb. section.

Hood, O. P. American Fuel Resources. M.E., Oct. 1927, p. 1061. Paper discusses growing appreciation of the value of fuel. Various fuel resources are mentioned. Points out that solid fuels are main sources of energy, and that coal resources economically available are less than generally believed. The passing of anthracite is foretold.

Hottel, H. C. See Haslam, R. T., and Hottel.

Houghton, Bert. Power Generation in Brooklyn. M.E., Apr. 1927, p. 309. Capacity of the Brooklyn Edison Company's stations and extent of the territory they serve; organization of operating department and attributes required in its personnel.

Howe, H. E. The New Competition. M.E., Apr. 1928, p. 291. Typical examples of the contributions of science to the new competition in which organized industries strive among themselves for the consumer's dollar.

Hoxie, F. J. Protection of Flour Mills and Grain Elevators against Fire and Explosion. M.E., Aug. 1927, p. 879. As common methods of protection are powerless, new methods must be devised. Study of problems presented and general recommendations to prevent explosions in grain elevators, cereal factories, and starch factories.

Hudson Avenue Generating Station, Brooklyn Edison Company. See Holmes, W. C.

Hydraulic feed for cutting tools. See Ferris, Walter.

Hydraulic feed for machine tools. See Galloway, R. M.

Hydraulic feed for milling machines. See Einstein, S., and Ernst.

Hydraulic turbines, characteristics for. See Pfau, Arnold.

Hydraulics and modern machine-tool design. See Guild, Waldo J.

Hydraulics, progress in. M.E., Jan. 1928, p. 18. Progress report of A.S.M.E. Hydraulic Division, outlining developments during 1927.

Hydroelectric plants, Cedar Creek. See Lee, W. S.

Hysteresis effects on spring operation. See Wood, Jos. K.

I

Identification of piping systems. See Standardization of identification, etc.

Indicators, engine, high-speed. See Jacklin, H. M.

Industrial education, certificates for. See Conant, Wm. S.

Industrial education, General Motors Institute of Technology. See Sobey, Albert.

Industrial education, Henry Ford Trade School. See Searle, Frederick E.

Industrial education. See also Moffatt, Ben. S.; Walker, P. F.

Industrial furnaces. See Azbe, Victor J.

Industrial management, budgetary control. See Coes, H. V.; Jordan, J. P.

Industrial management, control of factory overhead. See Perkins, H. G.

Industrial management, control of quality. See Graeper, Walter W.

Industrial management, morale as factor in time-study technique. See Cooke, Morris L.

Industrial management, personnel, steel industry. See Larkin, F. V.

Industrial management, power supply. See Polakov, Walter N.; Scott, Henry F.

Industrial management, production control in wrought-brass mill. See Clark, W. R., and Brewer.

Industrial management, railway shops and terminals. See Harrison, William R.

Industrial management. See also Production control.

Industrial mobilization for national defense. See Schwab, Charles M.

Industrial plants, location. See Carter, Emmett B.; Rogers, Tyler Stewart.

Industry, accidents in. See Wallace, L. W.

Industry, competition in. See Howe, H. E.

Industry, contribution of management to prosperity in. See Dunn, Gano.

Industry, effect of machinery in. See DuBrul, E. F.

Industry, taxation and. See Adams, T. S.

Internal-combustion engines, multi-cylinder indicator for. See Jacklin, H. M.

Iron and steel industry, progress in. M.E., Jan. 1928, p. 55. Progress report of A.S.M.E. Iron and Steel Division, outlining developments during 1927.

Irwin, J. B. Railway Smoke Abatement. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Problem of smoke prevention in railway terminals treated, and methods for remedying conditions suggested. Describes smoke-abatement project of Chicago and Northwestern Railway at Chicago Ave. and Halsted St., Chicago, where direct steaming system to serve 72 locomotives at one time is being installed.

Irwin, K. M. The Use of Pulverized Fuel at the Big Sioux Station of the Sioux City Gas and Electric Company. M.E., Aug. 1927, p. 763. Plant designed and laid out for use of powdered fuel. Difficulties encountered and how they were met.

J

Jacklin, H. M. Some Uses of the High-Speed Multi-Cylinder Indicator. M.E., vol. 49, Mid-May 1927, p. 543. Particulars of simple, rugged device for use on high-speed internal-combustion engines and air compressors; diagrams obtained; multi-unit development for obtaining diagrams simultaneously form all cylinders of engine or compressor.

Jackson, James A. Material Handling in the Port of New York. M.E., May 1927, p. 411. With particular reference to the economic aspects.

Johnson, J. B. Materials for Aircraft Parts Subjected to High Temperatures. Aeronautics Sec. Trans., Jan.-Apr. 1928. Describes operation conditions and materials which are now being used. Points out desirability of developing better materials to meet requirements of modern design.

Jordan, J. P. Budgetary Control. M.E., Dec. 1927, p. 1298. Psychological effect of budgetary control its greatest asset; it is, perhaps, the most valuable of all more or less mechanical management aids.

Josephs, L. C. Jr. The Design of Motor-Bus Bodies. M.E., vol 49, Mid-May 1927, p. 510. Various points considered by bus purchasers, such as utility, appearance, comfort, strength, lightness, durability, ease of repair, etc. Problem of changing styles; methods of design; materials available; etc.

Journal bearing performance, effect of running in on. See McKee, S. A.

K

Karelitz, G. B. An Investigation of the Performance of Waste-Packed Armature Bearings. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. Records some observations made while experimenting with full-size armature bearings. Packing of bearings, advantages of constant oil lift, and effect of grooving discussed. Bearing-shell temperatures for varying loads and speeds.

Kearny Works, Western Electric Co., location factors. See Spurling, O. C.

Keenan, J. H. Steam table research. See Steam table research, progress at Schenectady, N. Y.

Keeth, J. A. Improvements and Developments at Northeast Station of the Kansas City Power and Light Company. M.E., July 1927, p. 764. Discussion of paper on Present Tendencies of Steam-Station Design which outlined many of the developments at the Northeast Station. See Alden, Vern E.

Kemper, Carlton. Experimental Combustion Chambers Designed for High-Speed Diesel Engines. Oil & Gas Power Sec. Trans., Jan.-Apr. 1928. Discusses cycles for high-speed fuel-injection engines, and effect of increasing speeds on output of engines employing these cycles; three types of combustion chambers, and results of tests showing performance of engines equipped with each of the three types.

Kennedy, Paul S. Lacquer and Varnish Films. Wood Industries Sec. Trans., Jan.-Apr. 1928. Study revealing a definite similarity of failures, pointing out problems calling for research work and discussing development of a clear lacquer to withstand outside exposure on wood.

Keys, taper stock, standardization of. See Standardization of shafting.

Kilns, brick, fuels for. See Rice, W. E.

Kinzel, A. B. The Design of Dished and Flanged Pressure-Vessel Heads. M.E., June 1927, p. 625. Author presents what are believed to be rational methods of design of heads, considering the stresses in all parts of heads concave to the pressure. See also discussion, p. 636.

Klinefelter, C. F. Improvement of Foremanhip by the Conference Method. M.E., Apr. 1928, p. 307. Presents results of experience on Federal Board for Vocational Education in conducting foremanship conferences with different types of industries at different points throughout the country and similar experiences reported by state officials and industrial-plant officials.

Koehler, Arthur. The Need of Research on Tropical Woods before Marketing Them. Wood Industries Sec. Trans., 1928. Discusses need for scientific research on tropical woods instead of so-called practical trial-and-error method which is not only slow but gives unreliable results. Outlines properties research should determine and what experiments should be tried to overcome any objectionable features.

Konzo, Seichi. See Ross, Bruce Wallace, and Konzo.

Kreisinger, Henry. Application of Powdered Coal to Small Boilers of Industrial Plants. M.E., Nov. 1927, p. 1177. Author mentions certain limitations in design and operation of small plants that make attainment of high efficiencies impractical. Examples of application of pulverized coal to industrial plants, some of them having small units.

Kreisinger, Henry, and Purcell, T. E. Some Operating Data of Large Steam-Generating Units. M.E., Dec. 1927, p. 1303. Operating data of six plants using storage system of pulverized-fuel burning.

K.S.G. process of low-temperature carbonization. See Runge, Walter.

L

Lacquer and varnish films, woodworking industry. See Kennedy, Paul S.

Lake, F. W. Gas Lift as Applied in Oil Production. To be published, Petroleum Sec. Trans., 1928. Description of the central-plant system; results of the gas-lift process; factors in operation; limitations of the process.

Landing gears for aircraft. See Aldrin, E. E.

Langley Field apparatus for study of oil sprays for fuel-injection engines. See Beardsley, Edward G.

Langsdorf, A. S. The Effect of Atmospheric Smoke Pollution. M.E., Nov. 1927, p. 1213. Summary of opinions from current literature. Danger of smoke to numerous living organisms, including human beings, indicated. Results of smoke surveys in several cities, reasons for ill effects on human health, and data from reports of various cities are presented. Urges efforts to obtain analyses of air samples taken from numerous stations at frequent and regular intervals.

Langworthy, R. A. The Ruths Steam Accumulator. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Theory of steam accumulator and how it may be used to reduce boiler-load fluctuations and cost of steam production in industries where heat and power demands vary widely; construction, operation, and control; operating data on three installations, one in a textile mill, one in a sugar refinery, and one in a pulp and paper mill.

Larkin, F. V. Personnel Administration in the Steel Industry, M.E., Sept. 1927, p. 1013. Discusses question "How is scientific management applied to men in the steel industry and does it pay?"

Lee, W. S. Rack Structure and Headgates of Cedar Creek Hydroelectric Station. M.E. vol. 49, Mid-May 1927, p. 521. Details of the design of the rack structure and of the type of headgate adopted for the water intake at this station of the Duke Power Company on the Catawba River, near Great Falls, S. C.

Lichtenstein, Joseph. A Method of Analyzing the Performance Curves of Centrifugal Pumps. Hydraulic Sec. Trans. Jan.-Apr. 1928. Development of analytical and graphical methods of determining correction factors from test curves for use in bringing theoretical pump equations into harmony with practice.

Lincoln, J. F. Arc Welding. M.E., vol. 49, Mid-May 1927, p. 558. Advantages of arc-welded steel parts over those of cast iron or of riveted construction; savings in cost effected by replacing iron castings with arc-welded steel parts; inconsistency of permitting arc-welding in superheaters and steam piping and forbidding it in boilers, etc.

Liquid fuel, burning of. See Peabody, Ernest H.

Locomotive cylinders, high steam pressures in. See Fry, Lawford H.

Locomotives, back pressure and cut-off adjustment for. See McBride, Thomas C.

Locomotives, steam, Diesel engines for. See Hildebrand, R.

Locomotives, steam. See also Power test code for steam locomotives.

Lubricants, viscosity of under pressure. See Hersey, Mayo D., and Shore.

Lubricating cylinders of Diesel engines. See Northcutt, W. O.

Lubricating oils, viscosity under high hydrostatic pressure. See Viscosity of lubricating oils, etc.

Lubrication research, bibliography on. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. References on lubrication indicating the development and present status of research in this field, presented in appendix to report of A.S.M.E. Special Committee on Lubrication.

Lubrication research, progress in. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. Report contributed by A.S.M.E. Special Committee on Lubrication, showing its activities since its previous report in October, 1922.

Lucas, F. F. Photomicrography and Its Application to Mechanical Engineering. M.E., Mar. 1928, p. 205. Description of equipment of Bell Telephone Laboratories for technical microscopy, together with particulars regarding the application of high-power metallography to the study of structures found in hardened steel.

Lumber industry, materials handling. See Bell, Landon C.

M

Machinery, agricultural. See Zimmerman, C. B.

Machinery, its contribution to wealth and welfare. See DuBrul, E. F.

Machine-shop practice, progress in. M.E., Jan. 1928, p. 56. Progress report of A.S.M.E. Machine-Shop Practice Division, outlining developments during 1927.

Machine shops, maintenance of equipment. See Ashman, Geo. H.; Chapman, W. H.; Gotwals, C. S.; Hartman, Wm.; Weaver, J. R.

Machine-tool elements. See Standardization of small tools and machine-tool elements.

Machine-tool industry, shop-equipment policies. See Morrow, L. C.

Machine-tool replacement, economics of. See Curtis, Myron S.

Machine tools, application of anti-friction bearings. See Runge, R. F.

Machine tools, design of. See Guild, Waldo J.

Machine tools, development of. See Spencer, F. C.

Machine tools, hydraulic feed for. See Ferris, Walter.

Management. See Industrial management.

Management engineering, contribution to prosperity in industry. See Dunn, Gano.

Management engineering, progress in. M.E., Jan. 1928, p. 7. Progress report of A.S.M.E. Management Division, outlining developments during 1927.

Manufacturing, relation of building design to processes employed. See Wood, Charles P.

Marks, James H. The Control of Quality in a Manufactured Product. Management Sec. Trans., 1928. Control of quality in manufactured product can only be accomplished by coordination of design, provision of adequate and proper equipment and tools, establishment of proper controls to keep elements of the product within the limits of the standards set, and, by far the most important, the education of a controlling personnel.

Massachusetts Institute of Technology, steam table research at. See Steam table research, progress at Massachusetts Institute of Technology.

Mass production in furniture industry. See Richardson, Bayard Edwin.

Materials, X-ray examination of. See Davey, Wheeler P.

Materials handling as aid to production. See Eidmann, Frank L.

Materials handling, cargo cranes. See Dunell, Bernard.

Materials handling, electric trucks for. See Crockett, C. B., and Payne.

Materials handling, equipment, expenditures for. See Hagemann, George E.

Materials handling, lumber industry. See Bell, Landon C.

Materials handling, Port of New York. See Jackson, James A.

Materials handling, progress in. M.E., Jan. 1928, p. 13. Progress report of A.S.M.E. Materials-Handling Division, outlining developments during 1927.

Materials handling, sugar. See Buzzo, Joseph T.

Materials handling, woodworking industry. See Merrill, R. K., and Roderick.

Mathematical symbols, standardization of. See Standardization of scientific, etc.

McBride, Thomas C. Back Pressure and Cut-off Adjustment for the Locomotive. To be published, Railroad Sec. Trans., 1928. Subject is discussed from operating standpoint only. After presentation of data, author shows that for each locomotive there is a different back pressure at which maximum power can be obtained at lowest cost. Advocates method to determine best back pressure experimentally and use of back-pressure gages for guidance of locomotive engineers.

McCargar, D. M. Electrical Applications in the Petroleum Industry. M.E., Oct. 1927, p. 1107. Motors for use on different types of oil-well rigs, their characteristics, and comparative costs.

McConnell, Glenver. Drilling- and Pumping-Rig Equipment. M.E., Oct. 1927, p. 1105. Discussion of various methods, with comparative estimates of cost, of changing standard oil-well rig to improve its operation.

McCullough, H. F. Mechanical Loading and Coal-Mine Management. M.E., Mar. 1927, p. 261. Reasons why mechanical loading of coal, except in few special cases, is not yet economically successful.

McDonald, E. L. Burning Mid-Western Coals. M.E., Oct. 1927, p. 1082. States that while each of the Mid-Western coals has its own peculiarities

and must be burned accordingly, any of them can be burned if properly handled on proper equipment.

McIntyre, Harry John. See Wilson, Georges Samuel, Dudley, and McIntyre.

McKee, S. A. The Effect of Running In on Journal-Bearing Performance. M. E., Dec. 1927, p. 1335. Describes an investigation at the Bureau of Standards to evaluate effect of running in upon performance of babbitted, full-journal bearings.

Measurement of atmospheric pollution. See Moore, George T.

Mechanical engineering, application of photography to. See Mees, C. E. K.

Mechanical engineering, application of photomicrography to. See Lucas, F. F.

Mechanical engineering, flour-mill operation. See Bell, M. D.

Mechanical loading in coal mines. See McCullough, H. F.

Mechanical springs, bibliography on. See Research on mechanical springs.

Mees, C. E. K. General Applications of Photography to Mechanical Engineering. M.E., Mar. 1928, p. 198. Things can be photographed which cannot be seen or measured because the action is too quick for observation, or the available light too faint, or the eye insensitive to the radiation. Paper discusses stereoscopic photography, use of motion pictures with time acceleration or retardation, and use of photography as a recording medium.

Merrill, R. K., and Roderick, G. H. Improvements in Handling Methods in the Woodworking Industry. Wood Industries Sec. Trans., Jan.-Apr. 1928. Power-driven transfer cars; traveling cranes for serving kilns; monorail carriers for handling packaged lumber; electric lift trucks; elevators for inter-floor material handling; disposal of wood waste; various applications of conveyor systems.

Metallography, high-power, application to study of hardened-steel structures. See Lucas, F. F.

Metals, effect of temperature on properties of. See Research on effect of temperature, etc.

Metals, extrusion of. See Foisy, Geo. A.

Metals, ferrous, properties at high temperatures. See White, A. E., and Clark.

Metals, polishing, prerequisites of. See Divine, Bradford H.

Metal-working industry, shop-equipment policies. See Morrow, L. C.

Microscopy, technical, laboratories for. See Lucas, F. F.

Middle West, steam-station development in. See Steam-Station Development in the Middle West.

Mid-Western coals, burning. See MacDonald, E. L.

Miller, S. W. Examination of the Ruptured Head of the Ethylene Tank. M.E., Feb. 1927, p. 117. Description of test pieces taken; macro and micro photographs; chemical analysis; tensile tests; microstructures; conclusions regarding welds, weld metal, and test pressure used on tank. See also discussion in June issue, p. 636.

Milling machines, hydraulic feed for. See Einstein, S., and Ernst.

Minimum cost purchase quantities, determination of. See Davis, R. C.

Mobilization, industrial, for national defense. See Schwab, Charles M.

Moffatt, Ben. S. Principles of Apprenticeship Organization. M.E., May 1928, p. 383. Steps in an apprentice-training program; costs; forms of cooperative courses and selection of teaching personnel.

Moore, George T. The Measurement of Atmospheric Pollution, Visible and Invisible. M.E., Oct. 1927, p. 1067. Among methods suggested are Owens automatic air filter, jet dust counter, and measurement of acidity of air. The detection of pathogenic organisms in air also is discussed. Urges trial of many methods to determine proper remedies.

Moore, R. P. See Cushing, H. M., and Moore.

Morrow, L. C. Shop-Equipment Policies in Representative Plants. M.E., Sept. 1927, p. 970. Reasons for discarding equipment; time during which new equipment must pay for itself; methods of buying and discarding; faults of machine tools; methods of drive; records.

Moss, Sanford A. Measurement of Flow of Air and Gas with Nozzles. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. Brief résumé of various items of a satisfactory set-up for laboratory flow measurement, as developed at the Thomson Research Laboratory of the General Electric Company, Lynn, Mass.

Motion pictures, high-speed, for studying oil sprays for fuel-injection engines. See Beardsley, Edward G.

Motor buses, body design. See Josephs, L. C. Jr.

Motor buses, static loads on bodies of. See Norris, Charles B., and Potchen.

Motor trucks and L. C. L. freight. See Scarr, F. J.

Moultrop, I. E. and Norris, E. W. High-Pressure Steam at Edgar Station. To be published, Fuels & Steam Power Sec. Trans., 1928. Design of generating plant of Edison Electric Illuminating Company which uses steam at 1200 lb. Problems met in developing Edgar Station, equipment of original station and its extensions, and operating results obtained.

Moyer, James A. Education for Foremanship. M.E., Apr. 1928, p. 311. General discussion of status of foreman training in industry today. Attitude of management; topics for study and discussion; methods of instruction; instructors; working conditions.

N

National Cash Register Co., equipment maintenance. See Hartman, Wm.

National defense, industrial mobilization for. See Schwab, Charles M.

New York, port of, material handling in. See Jackson, James A.

Norris, Charles B., and Potchen, Joseph A. Static Loads upon Bus Bodies. Wood Industries Sec. Trans., Jan.-Apr. 1928. Report of tests made to determine static loads due to interaction of body and chassis upon which it is mounted, and a description of the methods employed.

Norris, E. W. See Moultrop, I. E., and Norris.

Northcutt, W. O. Lubricating Power Cylinders of Diesel Engines. M.E., Oct. 1927, p. 1068. Author offers constructive criticism of present methods of applying lubricating oil to power cylinders of Diesel engines, and recommends a method which is believed to be an improvement. Discussion,

data, and conclusions based on experimental study of this phase of Diesel-engine lubrication. Shows ill effects of oxidation.

Northwest, pulp and paper industry in. See Hockley, C. C.

Nozzles, measurement of flow of air and gas with. See Moss, Sanford A.

Nuts, proportions, standardization of. See Standardization of bolt, nut and rivet proportions.

O

Office furniture, mass production of. See Richardson, Bayard Edwin.

Oil- and gas-power engineering, progress in. M.E., Jan. 1928, p. 28. Progress of A.S.M.E. Oil and Gas Power Division, outlining developments during 1927.

Oil engines, efficiency. See Ellenwood, F. O., Evans, and Chwang.

Oil engines, fuel-injection, sprays for. See Beardsley, Edward G.

Oil engines, high-speed. See Shepherd, H. F.

Oil production, application of gas lift in. See Lake, F. W.

Oil sprays for fuel-injection. See Beardsley, Edward G.

Oil wells, drilling and pumping rigs. See McConnell, Glenver.

Oils, lubricating. See Viscosity of Lubricating oils, etc.

Oleo gears for aircraft. See Aldrin, E. E.

Optical instruments, quality control of. See Graeper, Walter W.

Ordnance work, anti-friction bearings in. See Brauer, F.

Ormsby, Erle. Organizing a Smoke-Abatement Campaign. M.E., Nov. 1927, p. 1216. Technical division of a city's engineers the first essential in a smoke-abatement campaign; major activities of technical division; research-publicity work; smoke surveys; educational work; conduct of campaign; appalling monetary loss caused by smoke.

Orrok, Geo. A. Economics of Coal Carbonization in the United States. M.E., vol. 49, Oct. 1927, p. 1055. Paper covers a review of the progress of carbonization in America, bringing it down to date. Adaptability of coke to the blast-furnace, production of coke, and development of coke ovens of different types. Low-temperature and high-temperature carbonization, etc.

Orrok, Geo. A. Report of Executive Committee of Steam Table Fund. See Steam table fund.

Osborne, N. S. Steam table research. See Steam table research, progress at Bureau of Standards.

Otto engines, efficiencies of. See Ellenwood, F. O., Evans, and Chwang.

Overhead, factory, control of. See Perkins, H. G.

Oxyacetylene-welded storage tank. See Rockefeller, H. E.

P

Paper industry in the Northwest. See Hockley, C. C.

Paper industry in the State of Washington. See Ross, Bruce Wallace, and Konzo.

Parr, S. W. Fuels, Past and Prospective. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. General discussion of factors in development of fuels, such as volume of outputs, types of fuels and their efficient use, and the smoke-abatement problem.

Passenger cars, heating and ventilating. See Russell, Edward A.

Passenger cars, roller bearings for. See Sanders, Walter C.

Payne, H. J. See Crockett, C. B., and Payne.

Peabody, Ernest H. The Burning of Liquid Fuel. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Discusses burning of liquid fuels, and supplies of oil, including shale oil, available. Burning of fuel, and types of burners for locomotive work. Power plant boiler efficiencies. Information on colloidal fuels.

Peebles, T. A. Automatic Combustion Control. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Early attempts to control combustion described, and importance of correct design pointed out. Results of incorrect combustion and recommendations for improvement.

Penstocks, forged steel, tests of. See Cox, John L.

Perkins, H. G. Control of Factory Overhead. To be published, Management Sec. Trans., 1928. So-called uncontrollable items of factory overhead, as well as controllable items, are amenable to downward adjustment. Factors influencing adjustment are discussed.

Personnel administration, steel industry. See Larkin, F. V.

Petroleum industry, electrical applications in. See McCargar, D. M.

Petroleum industry, progress in. M.E., Jan. 1928, p. 40. Progress report of A.S.M.E. Petroleum Division, outlining developments during 1927.

Pfau, Arnold. Specific Characteristics for Hydraulic Turbines. M.E., vol. 49, Mid-May 1927, p. 517. Suggests new expression for specific speed that is non-dimensional and embraces the three fundamental characteristics of a turbine: namely, peripheral-speed coefficient, velocity-of-flow coefficient, and efficiency.

Phelps, Stuart M. Properties of Refractories and Their Relation to Conditions in Service. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Conditions encountered in boiler settings of normal design; strength of refractories; confinement of heat; resistance to destruction; melting; slagging; structural, mechanical, and thermal spalling.

Photography, application to mechanical engineering. See Mees, C. E. K.

Photomicrography applied to mechanical engineering. See Lucas, F. F.

Pipe bends, expansion, stresses and reactions in. See Wahl, A. M.

Pipe flanges and fittings, cast-iron, malleable iron, and steel, standardization of. See Standardization of pipe flanges and fittings.

Pipe flanges, strength of. See Waters, Everett O., and Taylor.

Piping systems, identification of. See Standardization of identification, etc.

Plant location. See Rogers, Tyler Stewart.

Plant location factors of Western Electric Co. See Spurling, O. C.

Plants, industrial, location. See Carter, Emmett B.

Polakov, Walter N. Management of Industrial Power — The Executive's Viewpoint. M.E., vol. 49, Aug. 1927, p. 850. Executive should know possibilities of his installation and if they are being fulfilled; advantages of outside power; cost of power interruption; apportionment of power costs to different products.

Polishing metal, prerequisites of successful. See Divine, Bradford H.

Potchen, Joseph A. See Norris, Charles B., and Potchen.

Powdered coal, application to small boilers of industrial plants. See Kreisinger, Henry.

Powell, J. A., and Vetlesen, H. J. Surface Condensers in Steam Power Plants. M.E., May 1927, p. 417. Study showing how the most economical condenser installation for a given power plant can be determined; based on an average heat transfer actually obtained in condensers of different makes under normal operating conditions.

Powell, Sheppard T. Boiler-Feedwater Problems and Methods of Treatment. M.E., Sept. 1927, p. 1009. Brief survey of methods employed in treatment of boiler feedwater for removal of suspended solids, the elimination of scale-forming salts, purification of make-up by evaporation, and removal of non-condensable gases for prevention of corrosion. Includes statement of work of Boiler Feedwater Studies Committee.

Power generation, Brooklyn Edison Company. See Houghton, Bert.

Power-plant make-up evaporators. See Badger, W. L.

Power Test Code for Solid Fuels. Pamphlet, Apr. 1927. Specifies standard methods for a determination of these ascertainable chemical and physical properties which serve as indicators of the value of extensively used solid fuels when burned in boiler, industrial, and domestic furnaces. Includes methods for determining efficiency of the combustion process itself.

Power Test Code for Speed-Responsive Governors. Pamphlet, May 1927. Scope of code limited to performance of speed-responsive governors as applied to steam turbines, hydraulic turbines, reciprocating steam engines, and reciprocating oil and gas engines when employed for driving electric generators, mills, etc., or for uses where the speed-regulation requirements are similar to those for electric governors.

Power Test Code for Steam Locomotives. Pamphlet, Feb. 1927. Complete revision and extension of code included in group of ten published by A.S.M.E. in 1915. Laboratory tests and road tests.

Power Test Code on Instruments and Apparatus. M.E., Nov. 1927, p. 1243. Preliminary draft of Chapter 2, dealing with Pressure Measurements: Part I — Barometers.

Pressure measurements. See Power test code on instruments and apparatus.

Pressure-vessel heads, dished and flanged. See Kinzel, A. B.

Production, materials handling as aid to. See Eidmann, Frank L.

Production control, economic. See Raymond, Fairfield E.

Production control, quality. See Graeper, Walter W.; Marks, James H.

Production control, rubber industry. See Calhoun, F. B.

Production control, wage incentives and. See Charters, D. B.; Grothe, Oscar.

Production control, wrought-brass mill. See Clark, W. R., and Brewer.

Professional Divisions Progress Reports for 1927. M.E., Jan. 1928, pp. 7-64. Reports of Management, Materials-Handling, Hydraulic, Fuels, Oil and Gas Power, Power, Railroad, Petroleum, Aeronautics, Iron and Steel, Machine-Shop Practice, Textile, and Wood Industries Divisions of the A.S.M.E.

Professional Divisions Progress Reports. Railroad Division. Opportunities Afforded the Mechanical Engineer in the Railroad and Railroad-Supply Industries. M.E., Feb. 1927, p. 147. Progress report of Sub-Committee on Professional Service. Summarizes object and scope of investigation, procedure, and results so far obtained.

Pulp and paper industry in the Northwest. See Hockley, C. C.

Pulp and paper industry in the State of Washington. See Ross, Bruce Wallace, and Konzo.

Pulverized coal, use in steam power plants. See Irwin, K. M.; Tenney, E. H.

Pumping clay slurry through four-inch pipe. See Gregory, W. B.

Pumps, centrifugal. See Davey, H. T.

Pumps, centrifugal, performance curves of. See Lichtenstein, Joseph.

Pumps, centrifugal, separating hydraulic losses in. See Aisenstein, M. D.

Pumps, hydraulic, for machine-tool feeds. See Galloway, R. M.

Pumps, oil-well. See McConnell, Glenver.

Purcell, T. E. See Kreisinger, Henry, and Purcell.

Purchasing coal. See Smith, Morgan B.

Q–R

Quick, Ray S. Comparison and Limitations of Various Water-Hammer Theories. M.E., vol. 49, Mid-May 1927, p. 524. Confirmation of accuracy of elastic-water-column theory by experimental test data. Gives charts for graphically solving problems of maximum pressure rise with uniform gate motion and complete closure.

Racks and headgates. See Lee, W. S.

Railroad industry, mechanical engineer in. See Professional Divisions Progress Reports. Railroad Division.

Railroad mechanical engineering, progress in. M.E., Jan. 1928, p. 35. Progress report of A.S.M.E. Railroad Division, outlining developments during 1927.

Railroads, Diesel traction for. See Arthur, William.

Railway apprenticeship. See Thomas, F. W.

Railway bridges, vibration of. See Timoshenko, S.

Railway cars, roller bearings for. See Sanders, Walter C.

Railway draft gears, development and testing of. See Stuebing, A. F.

Railway smoke abatement. See Irwin, J. B.

Railway shops and terminals, management of. See Harrison, William R.

Raymond, Fairfield E. Economic Production Quantities. Management Sec. Trans., Jan.-Apr. 1928. Derivation of formulas for determining quantity which can be produced at lowest total unit cost, taking into account fixed charges, investment charges on capital, rental charges, and losses due to deterioration, obsolescence, and nature of process.

Refractories, boiler-furnace. See Research on boiler-furnace refractories.

Refractories, properties of. See Phelps, Stuart M.

Research in lubrication. See Lubrication research, progress in.

Research on Boiler-Furnace Refractories. A Laboratory Study of Slag Erosion, Samuel J. McDowell. M.E., May 1927, p. 429. Progress report of A.S.M.E. Special Research Committee on Boiler-Furnace Refractories. Presents report on laboratory phase of work being carried out at Columbus, Ohio, by A.S.M.E. committee, Fuel Division of Bureau of Mines, and Columbus Branch of Bureau of Standards.

Research on Boiler-Furnace Refractories. Refractories Service Conditions in a Furnace Burning Pittsburgh Coal on Underfeed Stokers, R. A. Sherman and W. E. Rice. Progress Report of A.S.M.E. Special Research Committee on Boiler-Furnace Refractories. Data which pertain to furnace conditions that affect life of refractories in furnaces burning coals from Pittsburgh No. 8 bed on underfeed stokers. Results of investigation conducted at Lowellville, Ohio, station of Pennsylvania-Ohio Power & Light Co. by A.S.M.E. committee and Bureau of Mines.

Research on Boiler Furnace Refractories. Service Factors Governing the Slagging of Boiler-Furnace Refractories, Ralph A. Sherman and Edmund Taylor. M.E., July 1927, p. 735. Progress Report of A.S.M.E. Special Research Committee on Boiler-Furnace Refractories. Deals with factors dependent on type of coal burned and method of burning. Presents values obtained in field investigation conducted by A.S.M.E. committee and Bureau of Mines.

Research on Boiler-Furnace Refractories. Temperatures in Powdered-Coal Furnaces having Extended Radiant-Heat-Absorbing Surfaces, Ralph A. Sherman. M.E., Apr. 1927, p. 335. Progress report of A.S.M.E. Special Research Committee on Boiler-Furnace Refractories. Presents data obtained as a part of the investigation of the proper application of boiler-furnace refractories being conducted by Bureau of Mines in cooperation with A.S.M.E. committee at Sherman Creek Station, United Elec. Light & Power Co., New York, N. Y.

Research on Effect of Temperature on the Properties of Metals. M.E., Oct. 1927, p. 1111. Includes progress report of joint research committee organized by A.S.M.E. and American Society for Testing Materials; and two reports presented before the joint committee at French Lick Springs, Ind., June 23, 1927, one on Results of Tests on Thermal Expansion of Four Classes of Steel, by N. L. Mochel, and one on Comparative High-Temperature Tension Tests on a Carbon Steel and on a Chromium-Molybdenum Steel, by L. W. Spring, Claire Upthegrove, and H. J. French.

Research on Mechanical Springs. Bibliography on Mechanical Springs. Pamphlet, Dec. 1927. Covers years 1678-1926. Indexed by authors, chronologically, and by subject.

Research, steam table. See Steam table research.

Research on Strength of Gear Teeth. The Influence of Elasticity on Gear-Tooth Loads. M.E., June 1927, p. 644. Progress Report No. 4 of A.S.M.E. Special Research Committee on Strength of Gear Teeth. Results of study on perfect gears.

Research on Strength of Gear Teeth. The Influence of Elasticity on Gear-Tooth Loads. M.E., July 1927, p. 767. Progress Report No. 5 of A.S.M.E. Special Research Committee on Strength of Gear Teeth. Results of study on influence of errors on acceleration loads.

Research on Strength of Gear Teeth. The Influence of Elasticity on Gear-Tooth Loads. M.E., Aug. 1927, p. 907. Progress Report No. 6 of A.S.M.E. Special Research Committee on Strength of Gear Teeth. Results of study on impact loads.

Research on Strength of Gear Teeth. The Influence of Elasticity on Gear-Tooth Loads. M.E., Nov. 1927, p. 1228. Progress Report No. 7 of A.S.M.E. Special Research Committee on Strength of Gear Teeth. Results of study on influence of rotating masses.

Research on Strength of Gear Teeth. The Influence of Elasticity on Gear-Tooth Loads. M.E., Dec. 1927, p. 1322. Progress Report No. 8 of A.S.M.E. Special Research Committee on Strength of Gear Teeth. Results of study on test runs with hardened and ground steel gears.

Research on tropical woods. See Koehler, Arthur.

Research on Worm Gears. Worm-Wheel Contact, Earle Buckingham. M.E., July 1927, p. 785. Preliminary report of A.S.M.E. Special Research Committee on Worm Gears. Shows how any worm-wheel contact condition can be determined by analysis and points out in particular the probable influence of the nature of the contact lines between a worm and a worm wheel upon the lubrication conditions, efficiency, and load-carrying ability.

Rice, W. E. The Use of Fuels in Brick Kilns. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Purpose of paper is to familiarize fuel engineers with peculiar requirements of brick-kiln operation. Describes firing process and limitations this imposes upon fuel or combustion engineer, illustrates some of faults that are often found and corrections that may be applied, and points to possible improvements.

Richardson, Bayard Edwin. Problems of Design for Mass Production in the Furniture Industry. Wood Industries Sec. Trans., 1928. Problems of design for mass production in the manufacture of commercial furniture; with special reference to office desks.

Rivets, proportions, standardization of. See Standardization of bolt, nut and rivet proportions.

Rivets, small. See Standardization of bolt, nut and rivet proportions.

Robinson, E. L. Steam table research. See Steam table research, progress at Schenectady, N. Y.

Rockefeller, H. E. Oxyacetylene-Welded Construction of a Large High-Pressure Storage Tank. M.E., May 1927, p. 405. Design of tank; selection of material; checking of welders; welding longitudinal and girth seams: design of new manhole reinforcing ring and its welding to the manhead. See also discussion in June issue, p. 636.

Roderick, G. H. See Merrill, R. K., and Roderick.

Rogers, Tyler Stewart. Plant Location. M.E., Nov. 1927, p. 1191. Studies to select suitable location should cover climate, natural resources, power sources, transportation of raw materials, distribution of finished products, labor characteristics and supply, state and local labor and tax legislation, cost of moving, type of plant, and local advantages.

Roller bearings for railway cars. See Sanders, Walter C.

Rolling mills, four-high. See Biggert, F. C., Jr.

Ross, Bruce Wallace, and Konzo, Seichi. Investigation of the Pulp and Paper Industry in the State of Washington. Wood Industries Sec. Trans., Jan.-Apr. 1928. Authors discuss the industry as it is conducted today and show that, owing to location, source of supply, water supply for both power and process, labor, etc., the state of Washington presents many attractions to the prospective plant builder.

Rubber industry, production control in. See Calhoun, F. B.

Runge, R. F. Recent Developments in the Application of Anti-Friction Bearings to Machine Tools. M.E., Sept. 1927, p. 955. Illustrations of a variety of designs; importance of proper lubrication and methods of preventing the accumulation of dust in bearings.

Runge, Walter. Low-Temperature Distillation. M.E., Aug. 1927, p. 875. General discussion dealing with three typical processes of low-temperature distillation, the calorific value of the semi-coke produced, and the price at which the coke should sell; includes a conservative estimate of production costs and profit.

Runge, Walter. The K.S.G. Process of Low-Temperature Carbonization. To be published, Fuels & Steam Power Sec. Trans., 1928. Development of "K.S.G." low-temperature process of coal carbonization, the principle of operation, and the field of application of the process.

Russell, Edward A. Heating and Ventilating of Passenger Cars. To be published, Railroad Sec. Trans., 1928. After setting forth essential requirements for ideal passenger-car heating, the author shows need for larger steam hose, valves, and car connections in long trains, and then describes an automatically controlled vapor system of car heating.

Ruths steam accumulator. See Langworthy, R. A.

S

Sanders, Walter C. The Design and Application of Roller Bearings to Railway Rolling Stock. M.E., Dec. 1927, p. 1325. Conditions which must be met in order successfully to apply roller bearings to journals of railroad equipment; advantages of tapered roller bearings as shown by series of tests.

Santa Fé Railroad apprenticeship system. See Thomas, F. W.

Satterfield, John M. Development of the Buffalo Airport. Aeronautic Sec. Trans., Jan.-Apr. 1928. Early work in planning airport; general layout; runways and drainage; power and other lines; hangars; garage; rolling stock; administration building, etc.

Sawford, Frank. A Smoke-Density Meter. M.E., Sept. 1927, p. 999. Discussion of desirability of measuring instruments in modern boiler room; description of recently developed meter for measurement of smoke density, and explanation of manner in which such a meter may aid in abatement of smoke and improvement of furnace efficiencies.

Scarr, F. J. The Motor Truck and L.C.L. Freight. To be published, Railroad Sec. Trans., 1928. Economics of handling less-than-carload lots as applied to railroad and motor truck, and use of container in both these methods of transportation.

Schwab, Charles M. Industrial Mobilization for National Defense. M.E., Nov. 1927, p. 1200. Address before Corps of Cadets, U. S. Military Academy, West Point, N. Y., May 12, 1927, on occasion of First National Meeting of the National Defense Division of the A.S.M.E.

Science, contribution to competitive industry. See Howe, H. E.

Scott, Henry F. Management of Industrial Power — The Engineer's Viewpoint. M.E., vol. 49, Aug. 1927, p. 853. Paper deals in simple manner with relation between plant engineer and the management. Technical details have been avoided, and paper describes how successful results can be obtained if there is a common understanding of the problems of the plant by the plant engineers and the management.

Searle, Frederick E. A Description of the Henry Ford Trade School. M.E., vol 49, Mid-May 1927, p. 570. Particulars of a successful, self-supporting trade school with 1700 students who work two weeks out of three in the school shop, devote the third week to a course of study, and who each receive from $450 to $1000 annually.

Selvig, W. A. See Fieldner, A. C., and Selvig.

Shafting, standardization of. See Standardization of shafting.

Shafting, transmission, standardization of. See Standardization of shafting.

Shepherd, H. F. The High-Speed Oil Engine. M.E., Sept. 1927, p. 991. Some notes on design, research, and shop practice.

Shop-equipment policies. See Morrow, L. C.

Shore, Henry. See Hersey, Mayo D., and Shore.

Small tools and machine tool elements. See Standardization of small tools and machine tool elements.

Smith, L. B. Steam table research. See Steam table research, progress at Massachusetts Institute of Technology.

Smith, Morgan B. Factors Governing the Purchase of Coal. M.E., Oct. 1927, p. 1063. Enumerates leading factors in coal selection and discusses purchase of fuels on a specification basis. An improved coal contract is given. Paper includes suggestions for study of coal-mining districts and individual mines.

Smoke-abatement, fuels and. See Parr, S. W.

Smoke-abatement, methods, Cleveland. See Whitlock, Elliott H.

Smoke-abatement, organizing campaign. See Ormsby, Erle.

Smoke abatement, railway. See Irwin, J. B.

Smoke density meter. See Sawford, Frank.

Smoke pollution, atmospheric. See Langsdorf, A. S.

Sobey, Albert. The General Motors Institute of Technology. M.E., vol. 49, Mid-May 1927, p. 553. Particulars of an educational program designed to provide the General Motors Corporation with a supply of highly skilled service men and trained workers for the plants, and to furnish a broad technical training for its future executives.

Spencer, F. C. The Development of Machine Tools from a User's Viewpoint. M.E., Dec. 1927, p. 1305. Experiences and practices of the Hawthorne Works of the Western Electric Compay's development organization, which is charged with the selection of machine tools.

Sperry, Elmer A. The Light Supercharged Diesel Engine for Use in Air Service. M.E., July 1927, p. 723. Particulars of author's proposal to reduce Diesel-engine weight per horsepower below that of gasoline engines by employment of high supercharging, and to eliminate fire risk from flying by use of Diesel engines running on cheap, low-volatile fuel oil.

Springs, hysteresis relative to operation of. See Wood, Jos. K.

Springs, mechanical, bibliography on. See Research on mechanical springs.

Spurling, O. C. Plant-Location Factors of Western Electric Co., Kearny Works. M.E., June 1927, p. 697. Comparison of advantages and disadvantages of various sites; reasons for locating plant at Kearny.

Stahl, E. C. M. Layout and Operation of the Electrical System of the Brooklyn Edison Company. M.E., Apr. 1927, p. 327. Layout and operation of system comprising 25-cycle transmission at 6600 volts to d.c. substations, 60-cycle transmission at 27,000 volts to a.c. substations, the two tied together by a 35,000-kw. frequency changer.

Standardization of Bolt, Nut and Rivet Proportions. Small Rivets. Pamphlet, B 18a, July 1927. Rivets of $\frac{7}{16}$ inch nominal diameter and under. Covers flat head, countersunk head, button head, pan head, and truss or wagon-box head rivets.

Standardization of Bolt, Nut, and Rivet Proportions. Tentative American Standards for Round Unslotted-Head Bolts. M.E., Jan. 1927, p. 59. Square-neck, fin-neck, ribbed, and countersunk carriage bolts; step bolts; button-head machine bolts.

Standardization of Bolt, Nut and Rivet Proportions. Wrench Head Bolts and Nuts and Wrench Openings. Pamphlet, B 18b, Feb. 1927. Rough, semi-finished, and finished square and hexagonal bolt heads; finished hexagonal cap screw heads; set screw heads; rough, semi-finished, and finished square and hexagonal regular nuts; finished and semi-finished hexagonal jam nuts; hexagonal light nuts; hexagonal and square machine screw nuts and stove bolt nuts; hexagonal castellated nuts; and open end wrench openings.

Standardization of Gears. Spur Gear Tooth Form. Pamphlet, B 6b, Jan. 1927. 14½ degree composite system. 20 degree stub involute system.

Standardization of Identification of Piping Systems. Scheme for the Identification of Piping Systems. M.E., Oct. 1927, p. 1144. Systematic plan employing color and other kinds of markings based on fundamental principles. From recommended American practice proposed by Committee on Identification of Piping Systems, organized under procedure of A.E.S.C. and jointly sponsored by A.S.M.E. and National Safety Council.

Standardization of Pipe Flanges and Fittings. Cast Iron Screwed Fittings. Pamphlet, B 16d, Dec. 1927. For maximum working saturated steam pressures of 125 and 250 lb. per sq. in. (gage).

Standardization of Pipe Flanges and Fittings. Malleable Iron Screwed Fittings. Pamphlet, B 16c, Dec. 1927. For maximum working saturated steam pressure of 150 lb. per sq. in. (gage).

Standardization of Pipe Flanges and Fittings. Steel Pipe Flanges and Flanged Fittings. Pamphlet, B 16e, June 1927. For maximum working steam pressures of 250, 400, 600, 900, and 1350 lb. per sq. in. (gage) at a temperature of 750 deg. fahr.; for maximum non-shock working hydraulic pressures of 325, 500, 720, 1080, and 1625 lb. per sq. in. (gage) at a temperature of 450 deg. fahr.; and for maximum non-shock working hydraulic pressures of 500, 750, 1000, 1500, and 2250 lb. per sq. in. (gage) at or near the ordinary range of air temperatures.

Standardization of Plain Limit Gages for General Engineering Work. Tolerance and Allowance Charts for Metal Fits, T. F. Githens. M.E., May 1927, p. 414. Presents series of charts graphically showing information tabulated in 1925 report on Tolerances, Allowances, and Gages for Metal Fits.

Standardization of Scientific and Engineering Symbols and Abbreviations. Mathematical Symbols. M.E., Aug. 1927, p. 924. Report of Sub-Committee No. 6 presenting proposed standard.

Standardization of Shafting. Code for Design of Transmission Shafting. Pamphlet, B 17c, Nov. 1927. Rational formulas and diagrams for computing shaft diameters for all conditions of loading. Capitulation of existing design formulas with their application and limitations. Recommendations concerning working stress, shock, and fatigue factors.

Standardization of Shafting. Gib Head Taper Stock Keys, Square and Flat. Leaflet, B 17e, 1927. Dimensions and tolerances.

Standardization of Shafting. Plain Taper Stock Keys, Square and Flat. Leaflet, B 17d, 1927. Dimesions and tolerances.

Standardization of Small Tools and Machine Tool Elements. T-slots, Their Bolts, Nuts, Tongues and Cutters, Pamphlet, B 5a, Mar. 1927. To provide, during transitional period, for interchange of attachments fitted to T-slots having throats of varying widths, standard includes table showing inserted and reversible tongues and tongue seats.

Stang, A. H. Compressive Tests on Balsa Wood. To be published, Wood Industries Sec. Trans., 1928. Describes tests conducted by Bureau of Standards to determine how much shortening took place under a uniformly distributed load, how much permanent set remained when the load was removed, and the compression time relations when the balsa wood was loaded by dead weights.

Steam and mechanical equipment, system operation of in central stations. See Cox, H. A.

Steam accumulator, Ruths. See Langworthy, R. A.

Steam-generating plants, operating data of. See Kreisinger, Henry, and Purcell.

Steam, high-pressure, chart for. See Steam table research, progress at Schenectady, N. Y.

Steam-power engineering, progress in. M.E., Jan. 1928, p. 32. Progress report of A.S.M.E. Power Division, outlining developments during 1927.

Steam power plants, design. See Alden, Vern E.; Collings, F. S.; Keeth, J. A.

Steam power plants, development in Middle West. See Steam-Station Development in the Middle West.

Steam power plants, surface condensers in. See Powell, J. A., and Vetlesen.

Steam-Station Development in the Middle West. M.E., Aug. 1927, p. 759. Present Tendencies of Steam Station Design, Vern E. Alden; Characteristics of High-Pressure Power-Station Design in the Middle West, F. S. Collings; Operation Problems Encountered in Boiler Operation at Omaha, Charles F. Turner; The Use of Pulverized Fuel at the Big Sioux Station of the Sioux City Gas and Electric Company, K. M. Irwin; Pulverized Coal in the Middle West, E. H. Tenney; Improvements and Developments at Northeast Station of the Kansas City Power and Light Company, J. A. Keeth; and Steam-Station Development in Middle West, C. S. Tomlinson.

Steam Table Fund, report of Executive Committee of M.E., Feb. 1928, p. 151. George A. Orrok, chairman of committee, reported on financial status of the research.

Steam table research, progress at Bureau of Standards, M.E., Feb. 1928, p. 152. Report by N. S. Osborne, H. F. Stimson, and E. F. Fiock, on progress in steam research at Bureau of Standards, with a determination of the mechanical equivalent of the mean heat unit.

Steam table research, progress at Harvard University. M.E., Feb. 1928, p. 158. Report by Harvey N. Davis, on progress in steam research at Harvard University.

Steam table research, progress at Massachusetts Institute of Technology. M.E., Feb. 1928, p. 153. Report by L. B. Smith, on progress in steam research at Massachusetts Institute of Technology.

Steam table research, progress at Schenectady, N. Y. M.E., Feb. 1928, p. 156. Report by J. H. Keenan on study of proposed high-pressure-steam chart development at General Electric Company.

Steam table research, progress at Schenectady, N. Y. M.E., Feb. 1928, p. 155. Report by E. L. Robinson on study of reheat factors at General Electric Company.

Steel, effect of temperature on. See Research on effect of temperature, etc.

Steel industry, personnel administration in. See Larkin, F. V.

Steel-wool industry. See Field, Crosby.

Steels, properties at high temperatures. See White, A. E., and Clark.

Stereoscopic photography. See Mees, C. E. K.

Stimson, H. F. Steam table research. See Steam table research, progress at Bureau of Standards.

Stinson, Karl W. The Modern Fire Engine. M.E., Dec. 1927, p. 1288. History of fire-engine development; requirements of modern type; the gasoline engine; types of pumps; comparison of steam and gasoline fire engines; need for standard specification for fire apparatus.

Stuebing, A. F. Development and Testing of Railway Draft Gears. M.E., July 1927, p. 746. Problems encountered in dealing with forces set up by heavy car during impact as in hump-yard switching and in starting and stopping heavy trains; present-day draft gears; characteristics required in draft gears; methods of testing draft gears; test data, etc.

Stokers, modern, characteristics of. See Daniels, F. H.

Storage tank, oxyacetylene-welded. See Rockefeller, H. E.

Stresses in pipe bends. See Wahl, A. M.

Sugar handling, conveyors for. See Buzzo, Joseph T.

Sugar manufacture, beet. See Cannon, W. Y.

Symbols and abbreviations, scientific and engineering, standardization of. See Standardization of scientific, etc.

System operation in central stations. See Cook, H. M.; Cox, H. A.

T

Tanks, ruptured. See Miller, S. W.

Tanks, storage, oxyacetylene welded. See Rockefeller, H. E.

Tanks, welded, stresses in. See Greene, T. W.

Taper stock keys, plain and gib head, standardization of. See Standardization of shafting.

Taxation, industry and. See Adams, T. S.

Taylor, J. Hall. See Waters, Everett O., and Taylor.

Temperature, effect of on properties of metals. See Research on effect of temperature, etc.

Tenney, E. H. Pulverized Coal in the Middle West. M.E., Aug. 1927, p. 763. Experiences in St. Louis stations.

Textile mechanical engineering, progress in. M.E., Jan. 1928, p. 61. Progress report of A.S.M.E. Textile Division, outlining developments during 1927.

Thomas, F. W. Railway Apprenticeship in a National Apprenticeship Plan. M.E., Aug. 1927, p. 886. Present-day rigorous requirements of railway mechanics; the Santa Fé apprentice system; school work supplementing shop instruction; outside apprentice activities; results.

Time study, morale as factor in. See Cooke, Morris L.

Timoshenko, S. Vibration of Bridges. To be published, Railroad Sec. Trans., 1928. Live-load effect of smoothly running load; impact effect of balance weights of locomotive driving wheels; impact effect due to irregularities in track and flat spots on wheels.

Tolerance and allowance charts for metal fits. See Standardization of plain limit gages, etc.

Tomlinson, C. S. Steam-Station Development in Middle West. M.E., Aug. 1927, p. 765. Further comments and discussion of papers presented at session on this subject at Kansas City. See Steam-Station Development in the Middle West.

Tools, machine, development of. See Spencer, F. C.

Towne lecture. See Adams, T. S.

Traction, Diesel, for railroads. See Arthur, William.

Trade School, Henry Ford. See Searle, Frederick E.

Trinks, W. The High Cost of Fuel Saving. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Compares progress in engineering with tendency toward fuel saving and gives some of the reasons for shunning new equipment that will save large percentage of fuel wasted by the old. A tax on fuel is recommended as a possible stimulus in interest of fuel saving.

Tropical woods, research on. See Koehler, Arthur.

Trucks, motor, and L.C.L. freight. See Scarr, F. J.

T-slots. See Standardization of small tools and machine tool elements.

Turbines, hydraulic, characteristics for. See Pfau, Arnold.

Turner, Charles F. Operation Problems Encountered in Boiler Operation at Omaha. M.E., Aug. 1927, p. 762. Problems at Omaha station of Nebraska Power Company, which has three 1500-hp. B. & W. cross-drum boilers and one 2000-hp. B. & W. cross-drum boiler, each equipped with a Coxe chain-grate stoker, a Foster side-wall radiant superheater, and a Duratex counterflow economizer.

V

Van Deventer, F. M. The Economics of Air-Preheater Applications. Fuels & Steam Power Sec. Trans., Jan.-Apr. 1928. Outline of the several chronological steps of development which led to the air preheater given, including brief description of principal types of air preheaters available. Discussion of conditions affecting selection of a preheater, and an outline of the economic problem. Method of procedure for selecting a heater proposed. Detailed calculations.

Varnish films, woodworking industry. See Kennedy, Paul S.

Ventilation, passenger cars. See Russell, Edward A.

Vetlesen, H. J. See Powell, J. A., and Vetlesen.

Vibration, frames of electrical machines. See Den Hartog, J. P.

Vibration, railway bridges. See Timoshenko, S.

Viscosimeters. See Hersey, Mayo D., and Shore.

Viscosity of lubricants under pressure. See Hersey, Mayo D., and Shore.

Viscosity of Lubricating Oils under High Hydrostatic Pressure, Applied Mechanics Sec. Trans., Jan.-Apr. 1928. Experiments by Robert V. Kleinschmidt presented in appendix to report of A.S.M.E. Special Committee on Lubrication.

W

Wadleigh, F. R. Bituminous-Coal Preparation in the Eastern Fields. M.E., June 1927, p. 650. Important results obtained through coal preparation; nature and source of ash; methods of preparation; mechanical cleaning and the various types of cleaning equipment; general preparation conditions in the various large producing districts.

Wage incentives and production control. See Charters, D. B.; Grothe, Oscar.

Wahl, A. M. Stresses and Reactions in Expansion Pipe Bends. To be published, Fuels & Steam Power Sec. Trans., 1928. Methods for determination of stresses and reactions in pipe bends in accordance with exact theory, taking into account cross-section distortion. Formulas for various types are given, and also curves for facilitating computation of maximum transverse and shearing stresses in accordance with exact theory.

Walker, P. F. Education for the Industries. M.E., Aug. 1927, p. 889. Specialized requirements that must be met; need for general education of public as to economic basis of industry, more complete and thorough job training, and education for industrial leadership.

Wallace, L. W. Accidents and Production. M.E., vol. 49, Sept. 1927, p. 949. Data obtained in nation-wide study conducted by American Engineering Council. Analyzes accident and production statistics of plants in twenty basic industries covering 120 products.

Washington, pulp and paper industry in. See Ross, Bruce Wallace, and Konzo.

Water hammer, theories on. See Quick, Ray S.

Waters, Everett O., and Taylor, J. Hall. The Strength of Pipe Flanges. M.E., vol. 49, Mid-May 1927, p. 531. Approximate methods of determining strength; proposed formulas for strength and deflection of rings and of hubbed flanges; recommended proportions of flat rings and hubbed flanges; tests on hubbed flanges; etc.

Weaver, J. R. Maintenance of Shop Equipment. Machine Shop Practice Sec. Trans., Jan.-Apr. 1928. Organization and methods used by Westinghouse Eelectric & Mfg. Co., at East Pittsburgh, Pa.

Welded tanks. See Greene, T. W.; Miller, S. W.; and Rockefeller, H. E.

Welding, arc. See Lincoln, J. F.

Well-type furnaces. See Cushing, H. M., and Moore.

Western Electric Company, Hawthorne Works, development of machine tools for. See Spencer, F. C.

Western Electric Company, Kearny Works, location factors. See Spurling, O. C.

Westinghouse Electric and Manufacturing Company, shop-equipment maintenance. See Weaver, J. R.

White, A. E., and Clark, C. L. Properties of Ferrous Metals at Elevated Temperatures as Determined by Short-Time Tensile and Expansion Tests.

To be published, Fuels & Steam Power Sec. Trans., 1928. Need for information in this field; research in progress in this country and need for greater refinement in methods of testing; review of tests at elevated temperatures; relative merits of five classes of steels at elevated temperatures on basis of proportional-limit findings.

Whitlock, Elliott H. Smoke-Abatement Methods Used in Cleveland. M.E., Oct. 1927, p. 1071. Author describes ordinances and equipment used in Cleveland. Smoke department must have connected with it competent engineer, well versed in combustion. Urges permits for all new equipment before its installation. Value of education pointed out.

Wickenden, W. E. What the National Engineering Societies Can Do for Engineering Education. M.E., Feb. 1928, p. 119. Suggests definite forms of collaboration between the colleges and national societies, including cooperation in defining a minimum basis for the "recognition" of colleges of engineering, in shaping recommended terms for award of professional degrees, in setting up credentials of educational achievement other than college degrees, in developing a scheme of after-college training for graduates, in guiding young men in their choice of a career and an educational program, and in providing means for introducing students to history, traditions, ideals, and ethics of engineering profession.

Wilson, Georges Samuel; Dudley, William Lyle; and McIntyre, Harry John. The Effect of Entrance and Discharge Angles on the Performance of a Centrifugal Fan. Applied Mechanics Sec. Trans., Jan.-Apr. 1928. Authors discuss tests conducted to determine variations in operating characteristics of a backward-curved-blade fan as affected by blade entrance angles, blade discharge angles, and fixed entrance and discharge angles but with different wheel diameters.

Windmills, for electric generation. See Fales, E. N.

Wood, Charles P. The Relation of Building Design to the Manufacturing Process. M.E., vol. 49, Mid-May 1927, p. 573. Broad principles governing building projects; special features of building design, assuming process to have been perfected; descriptions of buildings for the manufacture of soap, linoleum, plate glass, and textiles, and for publishing magazines and newspapers.

Wood, Jos. K. Hysteresis Relative to the Operation of Mechanical Springs. M.E., vol. 49, Mid-May 1927, p. 561. Springs, and spring systems in particular, are shown by the author to be associated with physical hysteresis of three characteristic types — mechanical, hypo-elastic, and hyper-elastic. Elastic-hysteresis effects are sufficiently large to be given serious consideration in design of measuring devices.

Woods, tropical, need for research on. See Koehler, Arthur.

Woodworking industry, lacquer and varnish films. See Kennedy, Paul S.

Woodworking industry, mass production in. See Richardson, Bayard Edwin.

Woodworking industry, materials handling in. See Merrill, R. K., and Roderick.

Woodworking industry, progress in. M.E., Jan. 1928, p. 63. Progress report of A.S.M.E. Wood Industries Division, outlining developments during 1927.

Worm-wheel contact. See Research on worm gears.

Wrenches, openings, standardization of. See Standardization of bolt, nut and rivet proportions.

Wrench-head bolts and nuts and wrench openings. See Standardization of bolt, nut and rivet proportions.

Wristpins, stresses and strains in. See Collier, Guy B.

X-Z

X-ray examination of structural materials. See Davey, Wheeler P.

Zimmerman, O. B. The Application of Machinery to Agriculture. M.E., Aug. 1927, p. 845. Outlines some of the problems involved in the mechanization of agriculture, with which engineers in other fields of industry may be somewhat unfamiliar.

Constitution, By-Laws, Rules, and Index

(Incorporating all revisions to March 15, 1928)

CONSTITUTION

Article C1, Name and Government

SEC. 1 The name of this Society is The American Society of Mechanical Engineers.

SEC. 2 The Society is a corporation, organized April 7, 1880, and chartered under the laws of the State of New York, December 23, 1881. A supplemental charter was issued on October 17, 1907, when the Society was consolidated with the Mechanical Engineers' Library Association.

The principal offices of the Society shall be in the City of New York.

SEC. 3 The Society shall be governed by this Constitution, the By-Laws and the Rules.

Article C2, Objects

SEC. 1 The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

Article C3, Membership

SEC. 1 The membership shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors.

SEC. 2 The rights and privileges of every member shall be personal to himself and shall not be transferable.

SEC. 3 Each member shall be entitled to vote on any question before any meeting of the Society, or before the Society as a whole.

SEC. 4 Every person admitted to membership shall be subject to the Constitution of the Society, and to any amendments that may be made from time to time.

Article C4, Qualifications for Admission

SEC. 1 Members of all grades shall be elected by the Council.

SEC. 2 An Honorary Member shall be a person of acknowledged professional eminence.

SEC. 3 A Member shall be an engineer, at least thirty-two (32) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least ten (10) years, and has been in responsible charge of important work for at least five (5) years, and is qualified to design as well as to direct engineering work.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

SEC. 4 An Associate need not be an engineer, but must have had such responsible connection with some branch of engineering, science, the arts, or industries, that the Council will consider him qualified to cooperate with engineers in the advancement of professional knowledge, and he must be at least thirty (30) years of age.

SEC. 5 An Associate-Member shall be an engineer, at least twenty-seven (27) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least six (6) years, and has been in responsible charge of work for at least two (2) years.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

SEC. 6 A Junior must have had such engineering experience as will enable him to fill a subordinate position in engineering work, or he must be a graduate of an engineering school of accepted standing. He must be at least twenty-one (21) years of age, and his connection with the Society shall cease when he becomes thirty-five (35) years of age, unless he has been previously transferred to another grade.[1]

Article C5, Fees and Dues

SEC. 1 The initiation fee for membership in each grade shall be:

Member	$ 25
Associate	25
Associate-Member	25
Junior	10
Promotion from Junior to a higher grade	15

SEC. 2 The annual dues for membership in each grade shall be:

Member	$ 20
Associate	20
Associate-Member	20
Junior, for the first six (6) years of his membership	10
Junior, after six (6) years	20

SEC. 3 The Council may permit any Member, Associate, or Associate-Member to become a Life-Member in the same grade, as provided in the By-Laws.

SEC. 4 The Council may remit the dues of any member for any special reason, as provided in the By-Laws.

Article C6, Nominating Committees

SEC. 1 The membership of the Society shall elect annually a Regular Nominating Committee, whose duty shall be to select candidates for the elective offices to be filled at each annual election, as provided in the By-Laws.

SEC. 2 Other nominating committees having the same powers may be constituted by the membership of the Society, as provided in the By-Laws.

Article C7, Directors (Council) and Officers

SEC. 1 The affairs of the Society shall be managed by a board of directors, chosen from its membership and styled "The Council."

SEC. 2 The Directors of the Society shall consist of a President, seven (7) Vice-Presidents, nine (9) Managers, and the last five (5) surviving Past-Presidents.

SEC. 3 The Directors shall be elected at the Annual Meeting of the Society, on the first Tuesday in December, as provided in the Charter.
The election shall be by sealed letter-ballot of the membership, as detailed in the By-Laws.

SEC. 4 The President shall be elected for one (1) year, the Vice-Presidents for two (2) years, the Managers for three (3) years.

SEC. 5 The Officers of the Society shall consist of the President, the Vice-Presidents and the Treasurer.

SEC. 6 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Treasurer for one (1) year.

[1] Inclusive of Junior Member elections from December 1922.

The Treasurer shall perform the duties usually pertaining to this office, in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

Any vacancy in the office of Treasurer shall be filled by appointment by the Council.

SEC. 7 The Directors may at any time, whenever sufficient cause shall appear to them, delegate to any member of the Society the performance of any duties required by the Constitution to be performed by any Director or by the Secretary.

Article C8, Council

SEC. 1 The Council shall have full control of the activities of the Society, subject to the limitations of the Constitution.

SEC. 2 The Council shall have power to fill vacancies in its membership by appointment until the next election, as provided in the By-Laws, except that the office of president shall be filled by the vice-president who is senior by age.

SEC. 3 The number of members constituting a quorum of the Council shall be as determined in the By-Laws.

SEC. 4 The Council shall present at the Annual Meeting of the Society a report verified by the president or treasurer or by twelve (12) members of the Council, showing the whole amount of real and personal property owned by the Society, where located, and where and how invested, and the amount and nature of the property acquired during the year immediately preceding the date of the report, and the manner of the acquisition; the amount applied, appropriated or expended during the year immediately preceding such date, and the purpose, object or persons to or for which such applications, appropriations, or expenditures have been made; also the names and places of residence of the persons who have been admitted into membership in the Society during the year.

The report shall be filed with the records of the Society, and an abstract shall be entered in the minutes of the proceedings of the Annual Meeting of the Society.

Article C9, Meetings of the Society

SEC. 1 The Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, provided it begins in the City of New York and continues there during the annual election of directors, held on the first Tuesday in December.

SEC. 2 The Semi-Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, as provided in the By-Laws.

SEC. 3 A Special Meeting of the Society may be called at any time and place at the discretion of the Council, or shall be called by the Council upon the written request of at least one (1) per cent of the membership.

The call for the meeting shall be issued at least thirty (30) days prior to the date set for it, and shall state the business to be considered. No other business shall be transacted at the meeting.

SEC. 4 The number of members constituting a quorum at any Meeting of the Society shall be as determined by the By-Laws.

SEC. 5 An action of a Meeting of the Society shall be deemed an action of the Society as a whole. Any expenditure required by such action is subject to approval and authorization by the Council.

Article C10, Professional Divisions

SEC. 1 The Council may authorize the organization of Professional Divisions composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C11, Local Sections

SEC. 1 The Council may authorize the organization of Local Sections composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C12, Publications and Papers

SEC. 1 The papers and publications of the Society shall be issued in such manner as the Council may direct.

Article C13, Secretary

SEC. 1 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Secretary for one (1) year.

SEC. 2 The Secretary shall perform the duties usually pertaining to this office, in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

SEC. 3 Any vacancy in the office of Secretary shall be filled by appointment by the Council.

Article C14, Funds

SEC. 1 The deposit, investment and disbursement of all funds shall be subject to the direction of the Council.

Article C15, Professional Practice

SEC. 1 In all professional and business relations the members of the Society shall be governed by the Code of Ethics incorporated in the By-Laws.

SEC. 2 Any member who has violated the Constitution of the Society, or who is guilty of conduct rendering him unfit to remain a member, may be expelled by the vote of fifteen (15) members of the Council, after he has been given opportunity to be heard in his own defense.

SEC. 3 The Society may approve or adopt any report, standard, code, formula, or recommended practice.

SEC. 4 The Society shall forbid and oppose the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices, in accordance with the By-Laws and Rules.

Article C16, Amendments to the Constitution

SEC. 1 At any Meeting of the Society, any person entitled to vote may propose in writing an amendment to this Constitution, provided that it shall bear the written indorsement of at least one (1) per cent of the membership.

Such proposed amendment shall not be voted on for adoption at that meeting, but shall be open to discussion and modification, and to a vote as to whether, in its original or modified form, it shall be mailed in printed form to the members of the Society for action.

If the members present at the meeting, not less than twenty (20) voting in favor thereof, shall so decide, then the Secretary shall mail in printed form to each person entitled to vote, at least sixty (60) days previous to the next Meeting of the Society, a copy of the proposed amendment as so decided by said vote, accompanied by any comment the Council may elect to make.

A ballot shall be sent with the proposed amendment, and the voting shall be by sealed letter-ballot, closing at noon of the twentieth (20th) day preceding the Meeting of the Society following the mailing.

The ballots shall be voted, canvassed and announced as provided in the By-Laws.

The adoption of the amendment shall be decided by a majority of the votes cast.

The presiding officer at the meeting of the society following the close of the ballot shall announce the result, and if the amendment is adopted it shall thereupon take effect.

SEC. 2 Any changes in the order or numbering of articles or sections of the Constitution required by an amendment shall be made under the direction of the Council.

SEC. 3 This Constitution shall supersede all previous rules of the Society, and shall go into effect upon the adjournment of the meeting of the society at which the presiding officer announces its adoption.

BY-LAWS

Article B1, Government

PAR. 1 At any regular meeting, the Council may, by a two-thirds vote of its members present, adopt or amend By-Laws in harmony with the Constitution, provided that such By-Laws or amendments shall have been submitted in writing at a previous meeting of the Council and the Secretary has mailed a copy to each member of the Council at least fifteen (15) days before the meeting at which action is to be taken. A By-Law or an amendment to a By-Law shall take effect immediately upon its adoption by the Council, and shall be published at once by the Secretary to all members of the Society.

PAR. 2 At any regular meeting, by a majority vote of its members present, the Council may adopt or amend Rules in harmony with the Constitution and the By-Laws. A Rule or an amendment shall take effect immediately upon its adoption by the Council, and shall be published by the Secretary to all the members of the Society.

PAR. 3 Any changes in the order or numbering of By-Laws or Rules made necessary by the adoption of amendments shall be made under the direction of the Council.

PAR. 4 Every question which shall come before a meeting of the Society or of the Council or of a committee, shall be decided by a majority of the votes cast, unless otherwise provided in the Constitution, the By-Laws and the Rules, or by the laws of the State of New York.

PAR. 5 The Rules contained in "Robert's Rules of Order Revised" shall govern the Society in all cases to which they are applicable, when not inconsistent with the By-Laws or the Rules of this Society.

Article B2, Objects

PAR. 1 The principal means for accomplishing the object of the Society shall include:

(*a*) Holding meetings for reading and discussing professional papers and for personal interchange of knowledge and views.

(*b*) Issuing publications.

(*c*) Investigating and reporting upon subjects of engineering interest.

(*d*) Promulgating reports, standards, codes, formulas and recommended practices.

(*e*) Encouraging affiliation of students of engineering with this Society.

(*f*) Contributing to the maintenance of the Engineering Societies Library, of which the Library of this Society is a part.

(*g*) Participating, as provided in the Rules, in joint movements with bodies having the same objects as this society, and cooperating with affiliated societies having like purposes.

PAR. 2 The policy of the Society shall be to give papers read before it the widest publicity.

PAR. 3 The Society shall not be responsible for statements or opinions advanced in papers or in discussion at meetings of the Society or of its Divisions or Sections, or printed in its publications.

PAR. 4 The Society reserves the right to copyright, at the discretion of the Council, any of its papers, discussions, reports or publications.

Article B3, Membership

PAR. 1 The Honorary Members shall not at any time exceed twenty-five (25) in number.

PAR. 2 In accordance with the Rules, a proxy may be given to a member entitled to vote, but shall not be valid for more than six (6) months.

PAR. 3 Proffered resignations shall be presented to the Council for action, and shall be accepted if the requirements of the Rules have been met.

Article B4, Qualifications for Admission

PAR. 1 A candidate for admission to the Society in any grade, except Honorary Membership, or a member desiring to change his grade, shall make application to the Council on an approved form, as detailed in the Rules.

PAR. 2 Fifteen (15) affirmative votes of the Council shall be required for the election of a candidate for any grade except Honorary Membership. Two (2) negative votes shall defeat an election.

PAR. 3 Each approved candidate shall be assigned by the Council to the grade of membership to which, in its judgment, his qualifications entitle him.

PAR. 4 Nomination for Honorary Membership may be made to the Council by at least twenty-five (25) members of the Society, who shall in all cases state in writing the grounds upon which the nomination is made.

PAR. 5 Election to Honorary Membership shall be by letter-ballot of the Council. Ballots shall be mailed by the Secretary to each member of the Council at least sixty (60) days in advance of the date set for the closure of such election. One (1) negative vote shall defeat an election to Honorary Membership.

PAR. 6 All matters relating to membership shall be in charge of the Standing Committee on Membership, under the direction of the Council.

Article B5, Fees and Dues

PAR. 1 The initiation fee and that part of the annual dues from the first month following the date of election to the first day of October, shall be due and payable on the first day of the month following the date of election. Only upon the payment of this amount shall the person elected be entitled to the rights and privileges of membership in the grade to which he is assigned. If such person does not comply with this requirement within three (3) months after notice of his election, the Council may declare his election void.

PAR. 2 The annual dues for each ensuing year shall be due and payable in advance on the first day of October.

PAR. 3 A member whose dues shall remain unpaid for three (3) months shall in the discretion of the Council not be entitled to the publications until his dues are paid.

PAR. 4 A member whose dues shall remain unpaid for twelve (12) months, shall, in the discretion of the Council be stricken from the roll of membership and shall cease to have any further rights as a member.

PAR. 5 A bill for annual dues shall be mailed to each member by October 1, with a copy of the above sections of the By-Laws. Notice of arrears shall be sent each month thereafter.

PAR. 6 At its first meeting in the calendar year the Secretary shall submit to the Council a list of the delinquents for action thereon in respect to their right to vote and receive the publications.

PAR. 7 At its first meeting after the close of the fiscal year on September thirtieth, the Secretary shall submit to the Council a list of delinquents for its action thereon in respect to their continuance on the rolls of the Society and retaining rights as members.

PAR. 8 If, in the case of non-payment of dues, the right to receive the publications of the Society or to vote be questioned, the books of the Society shall be conclusive evidence.

PAR. 9 A member may become a life member by paying the Society at one time an amount sufficient to purchase from an insurance company, satisfactory to the Finance Committee, an annuity equal to that member's dues (a) for his life expectation or (b) for the term for which he is required to pay dues in accordance with the Constitution, By-Laws and Rules.

PAR. 10 For distinguished service to the Society, the Council may confer life membership upon any member. Proposal for such action must be made at a regular meeting of the Council. Immediately following that meeting, the Secretary shall send to the members of the Council a letter-ballot upon the proposal, this ballot to close in sixty (60) days. Fifteen (15) affirmative votes shall be required to approve and one (1) dissenting vote shall disapprove such proposal.

PAR. 11 As detailed in the Rules, the Council may, for sufficient cause, temporarily excuse from payment of annual dues, any member who from ill health, advanced age, or other good reason assigned, is unable to pay such dues; and the Council may remit the whole or part of dues in arrears, or accept in lieu thereof desirable additions to the Library, or collections.

PAR. 12 The Council may restore to membership any person dropped from the rolls for non-payment of dues or otherwise, upon such conditions as it may deem best.

Article B6, Nominating Committees

PAR. 1 The Regular Nominating Committee of the Society shall consist of seven (7) members with seven (7) alternates elected at the Annual Meeting, as detailed in the Rules. The Chairman of the outgoing Nominating Committee shall serve as an advisory member, without vote, and the Secretary of the outgoing Committee may serve as alternate for him.

PAR. 2 The members and alternates of the Regular Nominating Committee shall be elected for one (1) year, and no member or alternate shall be eligible for more than two (2) consecutive terms. Serving as an alternate shall not affect the eligibility of a member to serve on the committee for two (2) terms, if elected.

PAR. 3 The names of those elected to serve on the Regular Nominating Committee shall be published by the Secretary by the first week in February of each year, accompanied by a request for suggestions for nominees.

PAR. 4 A vacancy in a Regular Nominating Committee of the Society shall be filled by the alternate for that vacancy, or, failing that, shall be filled by the Council.

PAR. 5 A Special Nominating Committee may be organized by any group of one (1) per cent of the membership of the Society in good standing certifying to the Secretary in writing their joint intention to organize such a Committee.

Article B7, Directors (Council) and Officers

(Nomination, Qualifications and Election)

PAR. 1 Within two weeks following the Spring Meeting, the Regular Nominating Committee shall deliver to the Secretary in writing the names of its nominees for the elective offices to be filled at the next election, together with the written consents of the nominees.

PAR. 2 The names and qualifications of nominees for the various offices proposed by the Regular Nominating Committee, shall be published by the Secretary immediately after the receipt of the report of the Nominating Committee.

PAR. 3 Candidates for the office of President and Vice-President shall be of the grade of Member of the Society. Candidates for all other elective offices may be of any grade of membership.

PAR. 4 Names of any nominees presented by any Special Nominating Committee must be in the hands of the Secretary by the first Tuesday in August of each year, and must be accompanied by the written consent of each nominee.

PAR. 5 On or before the third Thursday in August of each year, the Secretary shall mail to each member entitled to vote a ballot stating the names of the candidates for the elective offices to be filled at the next election, as detailed in the Rules.

PAR. 6 Voting for the election of Directors shall close at the City of New York at 10 o'clock in the forenoon on the fourth Tuesday in September in each year, and the ballots shall be canvassed, as detailed in the Rules.

PAR. 7 On or before the third Thursday in August of each year, the President shall appoint three (3) Tellers of Election of Directors, whose duty it shall be to canvass the votes cast, as detailed in the Rules. The term of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

PAR. 8 By the first day of October, the Secretary shall notify the candidates having the greatest number of votes for their respective offices.

PAR. 9 The Directors shall be declared elected by the presiding officer at the Annual Meeting of the Society in December, and their terms of office shall begin on the adjournment of the Annual Meeting.

PAR. 10 If a tie occurs in the vote for any officer, the presiding officer at the Annual Meetings shall cast the deciding vote.

PAR. 11 In the election of the Vice-Presidents, three (3) shall be elected every other year and four (4) the alternate years, to serve for two (2) years.

PAR. 12 In the election of the Managers, three (3) shall be elected each year to serve for three (3) years.

PAR. 13 A member in office shall not be eligible for immediate reelection to office at the expiration of the term for which he was elected, except the Treasurer. The restriction in this paragraph shall not apply to the Secretary, who is not an Officer or Director.

PAR. 14 Members in office shall continue in their respective offices until their successors have been elected or appointed, and have accepted their offices.

PAR. 15 The President shall perform the duties regularly or customarily attaching to his office under the laws of the State of New York, and such other duties as may be required of him by the Council or the By-Laws.

PAR. 16 In the absence of the President his duties shall be performed by the Vice-President then present, senior by length of membership in the Society, or in his absence or any other disability, by any other member of the Council designated by the Executive Committee or by the Council.

PAR. 17 The Treasurer shall be the legal custodian of all funds of the Society. The investment of all trust funds and of other permanent or temporary investment of funds shall be made by the Treasurer with the approval of the Finance Committee.

The Treasurer shall take part in the deliberations of Council, but shall have no vote therein.

PAR. 18 In the absence of the Treasurer his duties shall be performed by any other officer of the Society designated by the Council or by the Executive Committee.

Article BS, Council

PAR. 1 The Council shall consider the failure of any incumbent, from inability or otherwise, to perform the duties of his office, and may by a two-thirds vote, decree any elective office vacant. The Council shall thereupon appoint a member to fill the vacancy until the next election of officers, except

for the office of the President, which shall be filled by the Vice-President who is senior by age. Such appointment shall not render the appointee ineligible for election to any office.

PAR. 2 A quorum of the Council shall consist of eight (8) members.

PAR. 3 An act of the Council which shall have received the expressed or implied sanction of the membership at the following meeting of the Society, shall be deemed to be an act of the Society and cannot afterwards be impeached by any member.

PAR. 4 The Council may order the submission of any question to the membership for decision by letter-ballot. The Council may appoint Tellers to canvass such a ballot, as detailed in the Rules. The result of such a ballot shall be binding when confirmed by formal action of the Council.

COMMITTEES, ETC., APPOINTED BY THE COUNCIL

PAR. 5 The Council shall at its first meeting of each year appoint from its members an Executive Committee to act for it in the intervals between its sessions. The junior past-president shall be an ex-officio member of the Executive Committee. No act of the Executive Committee shall be binding until it has been approved by resolution of the Council. The Secretary may take part in the deliberations of the Executive Committee, without vote.

PAR. 6 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have the power to appoint, as it may deem desirable, an Administrative Committee to assist in the conduct of the affairs of the Society. Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 7 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have power to appoint, as it may deem desirable, any Professional Committee to investigate and report upon a subject of engineering interest, except that the procedure of the American Engineering Standards Committee shall be followed in organizing Sectional Committees. (See Paragraphs 42 to 44 of this Article.) Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 8 Administrative and Professional Committees shall be standing or special, as the By-Laws and Rules provide and the Council approves. The Chairmen of Standing Committees shall be entitled to a seat in the Council, but no vote. The term of office of one (1) member of each Standing Committee shall expire at the close of each Annual Meeting.

PAR. 9 Each committee shall perform the duties required by the By-Laws and Rules, or assigned to it by the Council.

PAR. 10 The Council may terminate membership on any committee on account of continued absence of the member, from inability or otherwise.

PAR. 11 The President shall appoint a member to fill each vacancy in the Standing Committees, as detailed in the Rules.

PAR. 12 Each committee shall at its first meeting elect a Chairman to serve for one (1) year.

PAR. 13 A member of a Standing Committee whose term of office has expired, shall continue to serve until his successor has been elected or appointed.

PAR. 14 On or before the fifteenth day of October of each year, each Standing Committee shall deliver to the Secretary a written report of its work for presentation to the Council, as detailed and tabulated in the Rules. The Council may embody such report in its Annual Report presented to the Society in accordance with the Constitution.

PAR. 15 Reports of Special Committees shall follow the procedure detailed and tabulated in the Rules.

Also, on or before the fifteenth day of October of each year, each Special Committee shall deliver a written progress report to the Secretary for presentation to the Council. Upon receipt of this report, the Council may, in its discretion, continue the committee.

The committee shall be discharged upon the adoption of the final report.

ADMINISTRATIVE COMMITTEES

PAR. 16 The Standing Committee on Finance shall, under the direction of the Council, have supervision of the financial affairs of the Society, including the books of account, as prescribed in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members of the Society, the term of one (1) member expiring at the close of each Annual Meeting, and two (2) members of the Council, the term of one (1) member expiring at the close of each Annual Meeting.

PAR. 17 The Standing Committee on Meetings and Program shall, under the direction of the Council, have supervision of the Meetings of the Society, except Special Meetings, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 18 The Standing Committee on Publications shall, under the direction of the Council, have supervision of the publications of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 19 The Standing Committee on Membership shall receive and scrutinize all applications for membership and report to each meeting of the Council the names of the candidates under consideration, together with the recommendations of the Committee on each, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting. Any member of the Council in office shall be entitled to attend meetings of the Membership Committee and to vote therein.

PAR. 20 The Standing Committee on Professional Divisions shall, under the direction of the Council, have supervision of the Professional Divisions of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 21 The Standing Committee on Local Sections shall, under the direction of the Council, have supervision of the Local Sections of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 22 The Standing Committee on Constitution and By-Laws shall, under the direction of the Council, have supervision of matters affecting the Constitution, By-Laws and Rules, and shall report on all matters in this connection referred to it by the Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 23 The Standing Committee on Awards shall, under the direction of the Council, have supervision of the awards of the Society as detailed in the Rules or prescribed by Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 24 The Standing Committee on Relations with Colleges shall, under the direction of the Council, have supervision of the Student Branches of the Society and of such work of the Society as aims to further the education of

engineers through the colleges and schools of accepted standing. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 25 The Standing Committee on Education and Training for the Industries shall, under the direction of the Council, have supervision of such work of the Society as deals with education and training for the industries through agencies other than the colleges and engineering schools. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 26 There shall be a Standing Committee on Library, which shall represent the Society on the Library Board of the United Engineering Society. The functions of this Committee shall be as detailed in the Rules. The number of members of this Committee and their terms of office shall be as required by the By-Laws of the United Engineering Society.

PROFESSIONAL COMMITTEES

PAR. 27 The Standing Committee on Standardization shall advise the Council on the dimensional standardization work of the Society, including relations with the American Engineering Standards Committee, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 28 The Standing Committee on Research shall advise the Council on the research work of the Society, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 29 The Standing Committee on Safety shall advise the Council on the activities of the Society having to do with engineering and industrial safety, except the activities of the Boiler Code Committee, for which special provision is made. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 30 The Special Committee on Boiler Code shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A. S. M. E. Codes for Pressure Vessels, including the interpretations of these codes, as detailed in the Rules. The Committee shall be appointed by the President and confirmed by the Council, and the President shall fill all vacancies in the Committee.

PAR. 31 The Standing Committee on Power Test Codes shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A. S. M. E. Power Test Codes, including the interpretations of such codes, as detailed in the Rules. The Committee shall consist of twenty-five (25) members and the terms of five (5) members shall expire at the close of each Annual Meeting.

PAR. 32 The Standing Committee on Professional Conduct shall, under the direction of the Council, have supervision of all matters relating to the Code of Ethics and its enforcement, as required by the Constitution, and as detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

SOCIETY REPRESENTATION

PAR. 33 The Council may, in its discretion, appoint a member or members, or other person or persons, to represent it at meetings of societies of kindred aim or at public functions. Such delegates shall be designated as "Honorary Vice-Presidents," and their duties shall terminate with the occasion for which they are appointed.

PAR. 34 The President, subject to the approval of the Council, may nominate or appoint a member or members, or other person or persons, to represent the Society on professional or other committees organized by other societies or by Government bureaus or departments, or otherwise.

PAR. 35 The Council shall elect three (3) Trustees to serve on the Board of Trustees of the United Engineering Society, as required in the By-Laws of that body.

PAR. 36 As provided in the By-Laws and Rules, the Society shall elect delegates to serve under the direction of the Council on the American Engineering Council, as required in the By-Laws of that body. If the number of delegates required to serve is at variance with the number elected or in office, the Council is empowered to make any adjustments necessary.

PAR. 37 The Council shall designate the Standing Committee on Library to serve as the Society's representatives on the Library Board of the United Engineering Society, as required in the By-Laws of that body.

PAR. 38 The Council shall nominate to the United Engineering Society two (2) Members of the Society to serve on the Engineering Foundation Board, as required in the By-Laws of that body.

PAR. 39 The Council shall appoint four (4) members to represent the Society on the John Fritz Medal Board of Award. The term of office of one (1) member shall expire at the close of each Annual Meeting.

PAR. 40 The Council shall appoint two (2) members of the Society to serve on the Committee on Washington Award of the Western Society of Engineers, in accordance with the Constitution of the Western Society of Engineers.

PAR. 41 The Council shall nominate three (3) members to represent the Society on the Division of Engineering of the National Research Council, as required in the By-Laws of that body.

AMERICAN ENGINEERING STANDARDS COMMITTEE

PAR. 42 The Council shall designate three (3) members to represent the Society on the American Engineering Standards Committee, as required by the Constitution of that body.

PAR. 43 The representatives of the Society on the Sectional Committees for which the Society is sponsor or joint sponsor, organized under the Rules of the American Engineering Standards Committee, shall be appointed by the President, subject to the approval of the Council.

PAR. 44 The representatives of the Society on the Sectional Committee for which the Society is not sponsor, organized under the Rules of the American Engineering Standards Committee, shall be appointed by the President, subject to the approval of the Council.

Article B9, Meetings of the Society

PAR. 1 An Annual Meeting may be adjourned to any other city than the City of New York upon the recommendation of the Committee on Meetings and Program, and upon authorization by the Council.

PAR. 2 A Semi-Annual (Spring) Meeting shall be held in any place only upon the recommendation of the Committee on Local Sections, confirmed by the Committee on Meetings and Program, and authorized by the Council at its regular meeting at the previous Semi-Annual Meeting.

PAR. 3 At the Annual Meeting of the Society, sixty (60) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 4 At the Semi-Annual Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 5 At a Special Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 6 Any Meeting of the Society at which a quorum is present may order the submission of any question to the membership for letter-ballot, and the result, if affirmative, shall be binding upon being confirmed by the next meeting of the Society.

PAR. 7 Announcement of all Meetings of the Society shall be made by the Secretary, as detailed in the Rules.

PAR. 8 All Meetings of the Society, except special meetings, shall be in charge of the Committee on Meetings and Program, under the direction of the Council.

PAR. 9 Papers submitted or solicited for Meetings of the Society shall be subject to the Rules detailed under Publications and Papers, Article 12.

PAR. 10 Following the completion of the preliminary arrangements, the Committee on Meetings and Program shall assume charge of the Regional Meetings, as detailed in the Rules governing Local Sections.

Article B10, Professional Divisions

PAR. 1 The object of each Professional Division shall be to provide, through an organization of members of any or all grades particularly interested in a branch of engineering included in the scope of the Society's activities, means for promoting the arts and sciences of that branch.

PAR. 2 A member in any grade may register in not more than three Professional Divisions upon a written application to the Secretary of the Society.

PAR. 3 A Professional Division of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Division shall be designated as the . . . . . Division of The American Society of Mechanical Engineers.

PAR. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Professional Divisions, but no action or obligation of a Division shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by a Division.

PAR. 5 For the convenient conduct of its affairs, each Professional Division shall organize an Executive Committee, as detailed in the Rules. The Executive Committee shall elect its Chairman each year, and upon confirmation by the Council, he shall serve as Chairman of the Division.

PAR. 6 The function of the Standing Committee on Professional Divisions, under the direction of the Council, shall be to organize, foster and coordinate Professional Divisions and their activities as detailed in the Rules.

PROFESSIONAL GROUPS

PAR. 7 In case the number of members interested in a particular branch of the Society's work is not large enough to warrant the formation of a full Professional Division under the provisions of the By-Laws, the Council may authorize the formation of a Professional Group, and will itself appoint an Executive Committee to organize such a Group, and will designate the Chairman of the Committee. When a sufficient number of members become attached to this Group, it may petition for reorganization into a Professional Division.

Article B11, Local Sections

PAR. 1 The object of a Local Section of the Society shall be to provide means for promoting the work of the Society by a local organization of members who are resident within a given territory.

PAR. 2 A Local Section shall consist of members of any or all grades and of other persons, as provided in the Rules.

PAR. 3 A Local Section of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Section shall be designated as the . . . . . Section of The American Society of Mechanical Engineers.

PAR. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Local Sections, but no action or obligation of a Section shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by a Section.

PAR. 5 For the convenient conduct of its affairs, each Section shall organize an Executive Committee, as detailed in the Rules.

PAR. 6 A Regional Meeting of several Local Sections may be held in any place upon the recommendation of the Committee on Local Sections confirmed by the Committee on Meetings and Program and authorized by the Council at any regular meeting. The principal objects of Regional Meetings are to provide, with the Spring Meeting, an annual series of meetings throughout the country, and also to develop the initiative of the Local Sections by placing responsibility upon them for the inauguration and conduct of technical meetings. The conduct of a Regional Meeting shall be as specified in the Rules. No Regional Meeting shall be considered a Meeting of the Society as a whole.

PAR. 7 The affairs of the Local Sections shall be in general charge of the Standing Committee on Local Sections, under the direction of the Council. This Committee shall be constituted as provided elsewhere in the By-Laws.

Article B12, Publications and Papers

PAR. 1 All publications of the Society shall be in charge of the Standing Committee on Publications, under the direction of the Council. All income from and expenditures for publications and all policies in regard to publications shall be controlled by the Council.

PAR. 2 The Record and Index issued each year shall contain the annual report of the Council, an index of the technical papers and discussions and reports of the technical committees and other records of Society activity selected by the Committee on Publications.

PAR. 3 Each member of the Society in good standing on the thirty-first day of December of each year shall be entitled to receive a copy of the Record and Index for that year.

PAR. 4 The Transactions of the Society shall be issued in sections corresponding with the Professional Divisions. Members registered in the Professional Divisions will receive the Transactions of the Divisions in which they are registered.

PAR. 5 *Mechanical Engineering* shall be issued monthly and shall be mailed regularly to each member in good standing.

PAR. 6 *A. S. M. E. News* shall be issued semi-monthly and shall be mailed regularly to each member in good standing.

PAR. 7 The Membership List shall be issued to each member in good standing who makes request for it.

PAR. 8 Papers presented to the Society and papers solicited by any of the committees shall be subject to the procedure in the Rules.

Article B13, Secretary

PAR. 1 The Secretary of the Society shall be the Secretary of the Council and of each of the committees.

PAR. 2 The Secretary may take part in the deliberations of the Council, but shall have no vote therein.

PAR. 3 The office of the Secretary shall be open for business, as the Rules prescribe.

PAR. 4 The Secretary may be subject to removal for cause by a vote of fifteen (15) members of the Council at any time, after one (1) month's written notice has been given him to show cause why he should not be removed, and after he has been heard in his own defense, if he so desires.

PAR. 5 The Secretary shall receive a salary which shall be fixed by the Council.

Article B14, Funds

RECEIPTS

PAR. 1 All funds shall be paid in to the Secretary, who shall enter them in the books of the Society, and deposit them to the account of the Treasurer in a bank designated by the Council.

PAR. 2 All bills against members and others shall be made and collected by the Secretary.

PAR. 3 All initiation fees shall upon receipt be deposited in the Reserve Account of the Society, and current expenses shall not be paid out of such Reserves without reference to the Finance Committee and its recommendations to the Council.

PAR. 4 All contributions to the Society for any specific purpose shall be disbursed under the direction of the Council.

PAR. 5 All registration fees collected at Meetings of the Society shall be paid into the general funds and be disbursed under the direction of the Council.

PAR. 6 All gifts or bequests not designated for a specific purpose shall be invested by the Council, and only the income used as directed by the Council.

PAR. 7 All gifts or bequests to the Society designated by the donors for a specific purpose, and all moneys permanently set aside by the Council for specific purposes, shall be invested and either the capital or income as so designated shall be used for that specific purpose for which it was designated.

PAR. 8 In the case of all moneys invested by the Council for permanent or temporary purposes, the Secretary of the Society shall at the close of each fiscal year compute the interest and return received for the year on the Society's invested funds. The Secretary shall determine an average rate of income and shall recommend an apportionment of such return to each of the several funds for which investment is made. Upon approval and order of the Council these apportioned returns shall be duly entered in the books of account of the Society as the income for the year on the various funds.

PAR. 9 At the discretion of the Council income from any fund may be allowed to accumulate for expenditure in any subsequent year, or the income may be added to the original fund and invested with it. But, in no case may the Council expend moneys from such specially designated funds, either from capital or from income duly apportioned as detailed in paragraph 8, for the current expenses of the Society.

PAR. 10 Upon the maturity of any permanent investment other than trust funds, the Treasurer and Finance Committee are required to reinvest such funds unless instructed and authorized to the contrary by the Council.

EXPENDITURES

PAR. 11 All expenditures shall be subject to the approval of Council and shall be made in accordance with the annual budget of appropriations as finally adopted by the Council at the beginning of each fiscal year, as provided in the Rules.

PAR. 12 Any obligations which may be incurred during the fiscal year and which will require the expenditure of the Society's funds outside of appropriations made by the Council in the approved annual budget shall first be referred to the Finance Committee for report by that Committee back to the Council.

PAR. 13 The Secretary shall report to the Council each month the total obligations incurred against each appropriation, together with the amount of each appropriation which is unexpended.

PAR. 14 The annual appropriations approved by the Council, or so much thereof as may be required for the work of the Society, shall be expended by the Secretary, under the direction of the committees.

PAR. 15 All bills against the Society shall be in charge of the Secretary who shall present them in proper form to the Finance Committee for audit, as provided in the Rules.

PAR. 16 Funds of the Society shall be paid out only upon vouchers duly signed by the Secretary and audited by the Finance Committee under the direction of the Council.

Article B15, Professional Practice

PAR. 1 All members of the Society shall subscribe to the following Code of Ethics, as required by the Constitution:

A CODE OF ETHICS FOR ENGINEERS

Engineering work has become an increasingly important factor in the progress of civilization and in the welfare of the community. The engineering profession is held responsible for the planning, construction and operation of such work and is entitled to the position and authority which will enable it to discharge this responsibility and to render effective service to humanity.

That the dignity of their chosen profession may be maintained, it is the duty of all engineers to conduct themselves according to the principles of the following Code of Ethics:

1 The Engineer will carry on his professional work in a spirit of fairness to employees and contractors, fidelity to clients and employers, loyalty to his country and devotion to high ideals of courtesy and personal honor.

2 He will refrain from associating himself with or allowing the use of his name by an enterprise of questionable character.

3 He will advertise only in a dignified manner, being careful to avoid misleading statements.

4 He will regard as confidential any information obtained by him as to the business affairs and technical methods or processes of a client or employer.

5 He will inform a client or employer of any business connections, interests or affiliations which might influence his judgment or impair the disinterested quality of his services.

6 He will refrain from using any improper or questionable methods of soliciting professional work and will decline to pay or to accept commissions for securing such work.

7 He will accept compensation, financial or otherwise, for a particular service, from one (1) source only, except with the full knowledge and consent of all interested parties.

8 He will not use unfair means to win professional advancement or to injure the chances of another engineer to secure and hold employment.

9 He will cooperate in upbuilding the Engineering Profession by exchanging general information and experience with his fellow engineers and students of engineering and also by contributing to work of engineering societies, schools of applied science and the technical press.

10 He will interest himself in the public welfare in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

Article B16, Amendments to the Constitution

PAR. 1 At least fourteen (14) days before the closing of a ballot on an amendment to the Constitution, the President shall appoint three (3) Tellers of Election on Amendments, whose duty it shall be to canvass the votes cast, as detailed in the Rules.

PAR. 2 The Tellers shall canvass the ballots and shall certify the result to the Presiding Officer at the Meeting of the Society at which the result is to be announced.

PAR. 3 In the case of a tie vote on an amendment, the Presiding Officer at the Meeting of the Society shall cast the deciding vote.

PAR. 4 The term of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

RULES

Article R2, Objects

RULE 1 The Council may approve the affiliation with the Society of any engineering society or legally organized group of engineers whose objects are in accord with the traditions, precedents and objects of this Society.

RULE 2 The term "Affiliated with The American Society of Mechanical Engineers" shall be used by any society or by individual members of it only while the respective governing boards of both societies continue the affiliation.

RULE 3 Affiliation with this Society of any other organization shall in no wise be interpreted as interfering with the independence, autonomy and self-control of that organization under its own Constitution or By-Laws.

RULE 4 The Society shall not be responsible for any act of any affiliated society.

RULE 5 Affiliation with this Society of any other organization may be terminated by the governing board of either giving sixty (60) days' written notice to the governing board of the other.

Article R3, Membership

RULE 1 Each member shall be entitled to a certificate of membership, signed by the President and Secretary of the Society; it shall remain the property of the Society and be returned on demand. Each member requesting a certificate shall pay the cost of engrossing.

RULE 2 Each proxy authorizing a person to vote for a member shall be signed, with an attesting witness, by the member giving it and submitted to the Secretary for verification of the right member to vote at the meeting at which the proxy is to be used.

RULE 3 Abbreviations of the titles to be used by members are as follows:

Honorary Member	Hon. Mem. A. S. M. E.
Member	Mem. A. S. M. E.
Associate	Assoc. A. S. M. E.
Associate-Member	Assoc-Mem. A. S. M. E.
Junior	Jun. A. S. M. E.

RULE 4 The emblem approved by the Council for each grade of membership shall be used only by those who belong to that grade.

RULE 5 Each resignation presented to the Council after the fiscal year has commenced (October first) must be accompanied by a statement from the secretary that the member has paid his dues up to and including that portion of the current fiscal year, unless such resignation is presented by January first, when no payment of current dues shall be required.

RULE 6 Each member desiring to resign shall deposit with the Secretary any badge and certificate of membership in his possession, and upon acceptance of his resignation the Secretary shall make him the stipulated refund for his badge.

Article R4, Qualifications for Admission

RULE 1 A candidate for admission to the Society as a Member, Associate or Associate-Member must refer to at least five (5) members who have personal knowledge of his qualifications.

RULE 2 A candidate for admission to the Society as a Junior must refer to at least three (3) members who have personal knowledge of his qualifications.

RULE 3 An application for membership from a candidate who may not be able to give the necessary number of references may be recommended to the Council for ballot after sufficient evidence has been secured to show that the candidate is worthy of admission to membership. Such candidates may refer to officers or voting members of other societies of like standing.

RULE 4 Each application may be referred by the Membership Committee to the Executive Committee of the Local Section to which the applicant would be logically attached, for information and comment by such Local Committee. If, after a period of twenty (20) days no comment is received from the Local Committee, the Membership Committee will proceed with the consideration of the application.

RULE 5 The references for each candidate shall be requested to make such confidential communications to the Membership Committee as will enable it to arrive at a proper estimate of the eligibility of the candidate.

RULE 6 The Membership Committee shall report to each session of the Council the names of all candidates together with the recommendation of the Committee on each. The Committee shall meet monthly to receive and scrutinize all applications, and shall seek further information as to the qualifications of a candidate whose evidence of eligibility is not clear to them.

RULE 7 The Membership Committee shall at once destroy all correspondence in relation to each candidate when his name has been placed on ballot by order of the Council, or upon the withdrawal of the application.

RULE 8 The Secretary shall mail to each member of the Council a ballot of the names and respective grades of the candidates for membership approved by the Membership Committee after having been duly posted in the publications of the Society. The voter shall prepare his ballot by crossing out the name of any candidate rejected by him, and shall close the ballot in an envelope and seal it. He shall enclose this envelope in a second envelope and sign it for identification. A ballot without the autographic endorsement of the voter on the outer envelope is defective and shall be rejected.

RULE 9 The Secretary shall count the ballots cast by the Council for election of new members, notify the applicants of their election, and regularly report the results of the ballot at the Council meeting next following each election. The names of applicants who are not elected shall neither be announced nor recorded.

Article R5, Fees and Dues

RULE 1 A Student Associate making application for membership within one (1) year of the date of his graduation shall be excused by the Council from the payment of dues for one (1) year from the date of election.

RULE 2 In accordance with B-5, Par. 11, the Council shall permanently exempt from dues any member of the Society who has paid dues for thirty-five (35) years, or who shall have reached the age of seventy (70) years after having paid dues for thirty (30) years.

Article R6, Nominating Committees

RULE 1 For the purpose of nominating members of the Regular Nominating Committee, the Committee on Local Sections shall, on or before the first day of October of each year, associate the Local Sections into seven (7) groups, each group to be responsible for nominating one (1) member of the Committee. The Sections which will comprise these groups shall, as far as possible, be contiguous geographically to each other.

RULE 2 The assignment of the Local Sections to such groups shall be announced at the Conference of Local Sections Delegates held at the Annual Meeting.

RULE 3 Each member of the Society entitled to vote shall be assigned to one of the seven (7) groups of Local Sections for the purpose of the election of the Regular Nominating Committee.

RULE 4 Each Local Section, except as quoted in Rule 5, shall be entitled to one (1) delegate to the Conference of Local Sections Delegates for the purpose of the selection of the Regular Nominating Committee, and shall be entitled to one (1) vote in the Conference in the selection of the member of the Committee nominated to represent its group of Sections.

RULE 5 In a case in which a Local Section is divided into branches, the Section shall not have a delegate, but each branch shall be entitled to a delegate with one (1) vote.

RULE 6 At the time of the announcement of the groups the Chairman of the Committee on Local Sections shall designate one (1) member of each group to call it together for organization. The result of the actions taken by the groups shall be submitted to the Conference of Local Sections Delegates for action.

RULE 7 The Chairman of the Committee on Local Sections, or in his absence, the senior member of the Committee, shall preside at the Conference of Local Sections Delegates at the time action is taken on the Regular Nominating Committee.

RULE 8 At the Business Session of the Annual Meeting of the Society, the Chairman of the Local Sections Conference shall present names recommended by the Conference for the Regular Nominating Committee.

Article R7, Directors (Council)

RULE 1 The names of the candidates proposed by the Regular Nominating Committee and by any other nominating committee, and the respective offices for which they are candidates, shall be printed in separate lists on the same ballot sheet, each list of candidates to be printed under the names of the members of the particular committee which proposed it.

RULE 2 Each list of names shall contain the name of only one (1) candidate for the office of President. For any other office than President, there may be more than one (1) candidate.

RULE 3 In the election of Directors, the voter shall prepare his ballot by crossing out the name of any candidate or candidates rejected by him and may write in the name of any eligible member of the Society, and shall enclose the ballot in an envelope and seal it. He shall then enclose this envelope in a second envelope marked "Ballot for Directors" and seal it, and he shall then write his name thereon for identification.

RULE 4 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

RULE 5 The Secretary shall certify to the competency and signature of all voters.

RULE 6 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

RULE 7 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers of Election.

RULE 8 A ballot containing more names than there are offices to be filled is defective and shall be rejected by the Tellers.

RULE 9 In counting the ballots for officers, the Tellers shall consider a ballot for any officer as valid providing the intent of the voter as to that particular office is clear, even though his ballot as to candidates for another office may for any reason be invalid.

Article RS, Council

REPORTS OF ADMINISTRATIVE COMMITTEES

RULE 1 Table of procedure for reports.

STANDING COMMITTEES

Finance; Meetings and Program; Publications; Membership; Professional Divisions; Local Sections; Constitution and By-Laws; Awards and Prizes; Relations with Colleges; Education and Training for the Industries; Library.

These are always Annual Reports

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

SPECIAL COMMITTEES

Any Special Committee the Council may appoint, such as Aims and Organization Committee (1920); Committee on Committees (1921); Committee on Relations of Society Activities (1922); Committee on Policy (1923); Joint Committees.

Annual Reports

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

Final Reports

Two (2) copies submitted to Secretary of Society, one (1) copy signed by members of committee with or without reservations.

Manifolded and mailed to Council for examination previous to call for vote.

At next meeting, Council votes to receive report, incorporate it in its own records, and discharge committee with thanks.

Presented to Society at following Business Meeting (Annual or Spring).

Submitted to Publications Committee for printing in the Record and Index and/or publication in pamphlet form for general distribution.

REPORTS OF PROFESSIONAL COMMITTEES

RULE 2 Table of procedure for reports.

STANDING COMMITTEES

Standardization; Research; Safety Codes; Professional Conduct; Power Test Codes—Main Committee.

These are always Annual Reports

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering*.

SPECIAL COMMITTEES

Research Committees (Bearing Metals, Lubrication, Flow Meters, and the like); Boiler Code; Power Test Codes—Individual Committees.

Annual Reports

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering*.

A. S. M. E. Special Committees—Final Reports

Two (2) copies submitted to Secretary of Society, one (1) copy signed by committee, with or without reservations.

Manifolded and mailed to selected list, including Council, for criticism and suggestions.

Referred back to Committee for consideration of criticism and suggestions.

Revised copy submitted to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it without printing, (2) refer it back to committee.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Presented for discussion at Business Meeting of Society or at public hearing. This open discussion must be fully advertised and a general invitation to attend extended to all persons and recognized organizations affected.

Written discussion from above carefully considered by Committee and report again revised if necessary.

Final draft submitted to any other committees of Council concerned for review and recommendations to Council if necessary.

Submitted to Council, with letter-ballot, for final approval and adoption as to form and substance.

Submitted to Publications Committee for printing in the Record and Index and/or publication in pamphlet form for general distribution.

A. E. S. C. Sectional Committees—Final Reports

Twelve (12) copies submitted to Secretary of Society, one (1) copy signed by Sectional Committee, with or without reservations.

Mailed to A. S. M. E. Standardization Committee, for study and recommendations to Executive Committee of Council.

Mailed to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it for A. S. M. E., (2) order its printing in *Mechanical Engineering* in full or abstract.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Reprints mailed to interested
(1) organizations
(2) firms
(3) individuals
with request for criticism and suggestions.

At the discretion of the A. S. M. E. Standardization Committee, public hearings may also be arranged.

Returned to Sectional Committee with the criticisms and suggestions.

Sectional Committee votes on revised draft, and submits two (2) copies to each sponsor, with a complete record of the vote.

Copies of revised report, standard or code, mailed to every member of Council, with letter-ballot.

On approval by Council and governing boards of other sponsors, it is submitted to A. E. S. C. for approval as American Standard or Tentative American Standard.

Reprinted in pamphlet form for sale by A. E. S. C. and the sponsors. Latter provide fifty (50) copies for free distribution to other standardizing bodies.

Article R8 (*cont.*) American Engineering Council

Rule 3 The President of the Society in office shall be the Chairman of the delegation of this Society to the meetings of the American Engineering Council, and the chairman of the A. S. M. E. representatives on the Executive Board.

Article R9, Meetings of the Society

Rule 1 Announcements of all Meetings of the Society shall be made in the publications. A notice of each meeting shall be given by the Secretary to each member not less than thirty (30) days before the date of that meeting.

Rule 2 The conduct of the professional and business sessions at any Meeting of the Society shall be in charge of presiding officers and assisting committees, appointed by the Meetings and Program Committee with the advice and consent of the President.

Rule 3 The features of the program outside of the professional and business sessions at any Meeting of the Society in any city shall be in charge of a committee appointed or designated by the Committee on Meetings and Program.

Rule 4 At the opening of every meeting the Chairman shall announce the definite amount of time allotted by the Committee on Meetings and Program for the presentation and discussion of each paper.

Article R10, Professional Divisions

Rule 1 When a number of members of the Society interested in a particular branch of the work of the Society favor the formation of a Professional Division for that branch, they may draw up a petition for the establishment of such a Division. Each such petition shall be sent to the Standing Committee on Professional Divisions for presentation to the Council with its recommendation. Upon approval of the petition by the Council, the Chairman of the Standing Committee on Professional Divisions shall appoint a temporary Chairman of the new Division.

Rule 2 The Executive Committee of each Professional Division shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting. Such officers as the Division may require shall be selected from the membership of the Society. Other committees of the Division shall be appointed by the Executive Committee as required.

Rule 3 Upon the organization of a Professional Division the initial selection of the Executive Committee shall be made by the President upon the nomi-

nation of the Standing Committee on Professional Divisions which will state the length of term of each appointee.

RULE 4 During the month of October of each year the Executive Committee of each Division will nominate to the President through the Standing Committee on Professional Divisions one or more individuals from whom the President shall appoint the member of the Executive Committee.

RULE 5 The Executive Committee of each Professional Division shall elect its own officers. No one shall be eligible for chairmanship until he has been a member of this committee for one year, except in the selection of the Executive Committee for a newly formed Division.

RULE 6 In case of resignation or decease, vacancies shall be filled by appointment of the Executive Committee subject to the approval of the President of the Society.

RULE 7 The Executive Committee may, subject to the approval of the Secretary of the Society, appoint or elect a Secretary of the Division, who shall report the proceedings of that Division to the Secretary of the Society for notice in the publications. He shall perform the duties of secretary of the Division, and such other duties as may be prescribed by the Executive Committee.

RULE 8 Any expenditure for the purpose of a Division chargeable to the Society must be authorized by the Secretary of the Society before it is incurred, and must be provided for in the annual budget approved by the Council. Any liability otherwise incurred shall not be binding on the Society, and must be met by the Division itself.

RULE 9 Notice of all Professional Division meetings shall be given in writing to the Secretary of the Society and to the Chairman of the Standing Committee on Professional Divisions at least six (6) weeks in advance of the date set for such meetings.

PROFESSIONAL GROUPS

RULE 10 The functions and responsibilities of a Professional Group shall be the same as those of a Professional Division, except that the Chairman of the Executive Committee, although having a seat in the conferences of the Chairmen of the Professional Divisions, shall have no vote.

RULE 11 The activities of a Professional Group shall be subject to the jurisdiction of the Standing Committee on Professional Divisions.

RULE 12 The Council reserves the right to disband any Professional Group on sixty (60) days' notice.

Article R11, Local Sections

RULE 1 When a number of members of the Society in any territory favor the formation of a Local Section in that territory, a preliminary meeting shall be called and notice sent to the entire membership of the Society residing in that territory. At this meeting a petition for the formation of a Local Section, containing suggestions as to the territory to be included in the Section, may be presented, and if adopted, shall be sent to the Standing Committee on Local Sections for recommendation to the Council.

RULE 2 Upon the approval by the Council of the petition, a meeting of the signers shall be held for the selection of a temporary Executive Committee of at least five (5) members. This Committee shall have charge of, and be responsible for, the proceedings of the Local Section until the next election of officers.

RULE 3 The Executive Committee of a Local Section shall consist of a Chairman, a secretary, and such other officers as may be found desirable. Such

officers shall be elected by ballot of the members of the Society constituting the Section. The Committee shall be elected before the first day of June each year and shall take office on the first day of July.

RULE 4 A member of the Society shall be entitled to vote or to hold office in not more than one (1) Local Section at a time.

RULE 5 The Chairman of each Local Section shall have the privilege of attending all meetings of the Standing Committee on Local Sections.

RULE 6 The secretary of each Local Section shall report the proceedings of that Section to the Secretary of the Society for notice in the publications. He shall discharge the duties of secretary of the section, and such other responsibilities as may be prescribed by the Executive Committee.

RULE 7 Any expenditure chargeable to the Society for the purpose of any Local Section must be provided for in the annual budget approved by the Council. No liability otherwise incurred shall be binding upon the Society.

RULE 8 Each Local Section shall have the privilege of representation at the Annual Meeting of the Society by one (1) official delegate. Such delegate, the Chairman, if possible, may have such portion of his expenses for transportation to the meeting refunded by the Society as the Committee on Local Sections may direct.

RULE 9 Each Local Section shall use only such uniform stationery as is supplied by the Secretary of the Society.

RULE 10 For the convenient cooperation between the Local Sections and the Professional Divisions, each Local Section may appoint an individual or a committee to act as a correspondent with each Professional Division, with duties that will comprise generally the arranging with the Professional Division for the presentation of papers, holding of meetings, etc., within that particular Local Section, and as far as possible, to act as a means of furnishing information, secured within the Local Section, which might prove of interest to the Division.

RULE 11 A Local Section may affiliate with existing local engineering organizations, or form jointly with them new local engineering organizations, but the plan of such affiliation or organization, and the obligations assumed by the Local Section and the Society thereby, shall first be approved by the Council. Any expenditures incurred in such an affiliation shall be binding only on the Section and not on the Society as a whole.

RULE 12 A Local Section may arrange to hold joint meetings with other engineering organizations and may invite members of such organizations to attend its meetings, but all expenses incurred shall be binding only on the Section and not on the Society as a whole.

RULE 13 Each Local Section may adopt its own By-Laws, for the conduct of its affairs, provided such are in harmony with the Constitution, By-Laws and Rules of the Society, and provided also every publication of such By-Laws be prefaced with a copy of this Rule.

RULE 14 The Council of the Society, on sixty (60) days' notice, may suspend or disband any Local Section.

REGIONAL MEETINGS

RULE 15 A Regional Meeting may be held upon petition to the Council of a group of Local Sections. Such a petition must bear the signatures of the Chairmen or their representatives on the Executive Committees of the Local Sections proposing to participate in the meeting.

RULE 16 The principal means for accomplishing the object of Regional Meetings shall be the presentation and discussion of technical papers; industrial visits, excursions and entertainments may also be provided.

RULE 17 The plan of procedure for organizing and conducting a Regional Meeting shall be as determined from time to time by the Standing Committees on Local Sections and on Meetings and Program, which shall jointly make recommendations to the Council on all matters affecting Regional Meetings.

RULE 18 The place of a Regional Meeting shall be determined by the Council upon the concurrent recommendation of the Standing Committees on Local Sections and on Meetings and Program.

RULE 19 Following the completion of the preliminary arrangements, each Regional Meeting shall be under the jurisdiction of the Committee on Meetings and Program. The Local Sections participating in the meeting shall appoint a special local committee to conduct the meeting, which committee shall act as a sub-committee of the Committee on Meetings and Program.

RULE 20 Papers for presentation at Regional Meetings are subject to the rules governing presentation of papers before the Society, enumerated elsewhere in the Rules.

RULE 21 Notice of a Regional Meeting shall be published by the Secretary of the Society at least six (6) weeks in advance of the date of the meeting.

RULE 22 Cooperation with other national and local engineering societies in a Regional Meeting shall be encouraged. Preliminary arrangements for such cooperation shall be made through the Standing Committee on Local Sections, but official conclusions of any preliminary arrangements must be made by the respective secretaries of the national and local societies participating.

RULE 23 No Regional Meeting shall be considered as a Meeting of the Society as a whole, and no business of the Society may be transacted at such a meeting.

STUDENT BRANCHES, ASSOCIATE STUDENT SOCIETIES, AND ENROLLED STUDENTS

RULE 24 A group of students in an Engineering School may petition the Council for the formation of a Student Branch of the Society if the Engineering School conforms to the following requirements:

(*a*) A preparation for entrance of four (4) years at high school or its equivalent.

(*b*) An adequate staff for teaching mechanical engineering.

(*c*) At least one (1) member of the faculty a member of The American Society of Mechanical Engineers.

(*d*) An equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering.

(*e*) A course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering. Members of Student Branches shall be known as Student Associates.

RULE 25 (*a*) A group of Student Associates interested in mechanical engineering may petition the Council for the formation of a Student Branch of the Society. [Heretofore, fifteen (15) has been the usual minimum number in such a group] or

(*b*) Established Student Engineering Societies in schools or colleges of accepted standing may petition the Council for association with the Society. Mechanical engineering students in such Societies shall also be regarded as Student Associates of the Society.

RULE 26 An application for a Student Branch, or an association by a Student Engineering Society, must be made to the Secretary of the Society. Such applications will be referred to the Standing Committee on Relations with Colleges, and by it reported to the Council for final action. The application should indicate clearly the number of teachers of mechanical engineering, the laboratory facilities, in a general way, and the number of mechanical engineering students. A catalogue of the college should accompany the application.

RULE 27 The name of a Student Branch affiliated with the Society shall be the ..... Student Branch of The American Society of Mechanical Engineers.

RULE 28 Each Student Branch shall be autonomous, subject to such limitation as may be set by the Constitution, By-Laws and Rules of the Society, and the Council.

RULE 29 So far as practicable, each Student Branch shall, through its secretary, furnish to the Secretary of the Society for notice in the publications, reports of meetings held and business transacted.

RULE 30 Upon recommendation of each Student Branch, the President of the Society shall designate a member of the Society to be Honorary Chairman of the Student Branch for each year. The Honorary Chairman shall be *ex-officio* a member of the governing body of the Student Branch.

RULE 31 The presiding officer chosen by each Student Branch shall be styled the Chairman of the ..... Student Branch of The American Society of Mechanical Engineers.

RULE 32 The Committee under whose management the affairs of the Student Branch are conducted shall have at least three (3) members in addition to the Honorary Chairman. The names shall be communicated to the Secretary of the Society.

RULE 33 The names of committees of the Student Branches and papers or stationery must bear the words "Student Branch."

RULE 34 Any Student Branch may have printing done by the Society at cost. In case a Student Branch desires to publish any papers in local journals or elsewhere, it should first ascertain that the Society does not itself desire to publish such paper. The privilege of priority in publication shall always be the right of the Society. The Student Branch shall claim no exclusive copyright.

RULE 35 A Student Associate is entitled to the publications of the Society at special rates, as prescribed in the Rules for Papers and Publications.

RULE 36 With a view to assisting graduates in getting acquainted and to enable them without financial burden to secure benefits of the technical meetings of the Society, a member of a Student Branch will upon graduation be enrolled without additional payment as a member of any Local Section of the Society.

RULE 37 The affairs of the Student Branches shall be in general charge of the Standing Committee on Relations with Colleges, in accordance with the By-Laws.

RULE 38 (*a*) Any person registered as a student in a University or Technical School, complying with stipulations of Rule 24 and pursuing a regular course of study in Mechanical Engineering therein, may be enrolled as an Enrolled Student of The American Society of Mechanical Engineers as hereinafter provided.

(*b*) Application for admission as an Enrolled Student of the Society in those colleges where no student branch has been formed shall be made on a regular form approved by Council. This application shall set forth the age and place of birth of the applicant, the year in which he entered and will complete his college course, and the degree to which such course leads, together with a statement of any experience which he may have had during the summer vacations or otherwise. It should bear the endorsement of at least one member of the Faculty, preferably one who is a member of the A. S. M. E. or another engineering society of standing.

(*c*) These applications shall be forwarded to the Headquarters of the Society and passed upon by the Committee on Relations with Colleges.

RULE 39 Each Enrolled Student shall pay an annual fee of $2.50, payable in advance. The period of Student enrollment shall not exceed three years, nor shall it extend more than one and one-half years beyond the

date of graduation from, or of leaving the University or Technical School; the period of enrollment shall date from the first of January nearest the date of filing application.

RULE 40 The annual fee of $2.50 paid by each enrolled student shall be applied as a subscription to *Mechanical Engineering* for the year covered by such payment.

Article R12, Publications and Papers

RULE 1

(*A*) The annual subscription price for *Mechanical Engineering* is:

[1] Member	$ 3.00
Member (additional subscription)	4.00
Non-Member in United States	5.00
Non-Member in Canada	5.75
Non-Member in other Foreign Country	6.50
Library	4.00
Student Associate	2.50
Enrolled Student	2.50

(*B*) The annual subscription price for Transactions as published in sections is:

[1] Member, for three sections	$ 2.00
Non-Member, for each section except Aeronautics, and Fuels and Steam Power	4.00
Non-Member, for Aeronautics Section	5.00
Non-Member, for Fuels and Steam Power Section	8.00

PAPERS

RULE 2 Papers may come to the Society:

(*a*) By voluntary submission by members or non-members.

(*b*) As a result of request of (1) the Standing Committee on Meetings and Program; (2) the Standing Committee on Professional Divisions or a Professional Division; (3) the Standing Committee on Local Sections or a Local Section.

RULE 3 Voluntary papers are classified as those suitable for presentation: (1) at a meeting of the Society, either before a general session or a Professional Division session; (2) at a Regional Meeting; (3) before a Local Section.

RULE 4 All voluntary papers must be sent to the Secretary of the Society, and be submitted by him to the Standing Committee on Meetings and Program. Such papers may be either accepted for presentation at a general session of the Society; referred to the Standing Committee on Professional Divisions; referred to the Standing Committee on Local Sections; or returned to the Secretary for transmission to the author with or without suggestions for modification and re-submission.

RULE 5 Papers referred to the Standing Committees on Professional Divisions or on Local Sections may be accepted by these committees and referred to a Professional Division, a committee on a Regional Meeting, or a Local Section, for assignment to a session, or, if such assignment cannot be arranged, may be returned to the Secretary for transmission to the author.

RULE 6 Requested papers will in general be suitable for the purpose for which they have been sought, but all such papers intended for presentation at an Annual or Spring Meeting of the Society must be passed upon by the Standing Committee on Meetings and Program.

RULE 7 Papers requiring advance distribution may be turned over to the Standing Committee on Publications for consideration for advance publication

[1] For members the subscription price is included in the annual dues.

in *Mechanical Engineering;* such copies as are required for distribution may be printed in pamphlet form and an abstract, approved by the Standing Committee on Publications, published in *Mechanical Engineering.*

RULE 8 Papers requiring discussion at a meeting to determine their value and general interest may be accepted for presentation, but shall not be put in type until they have been read and discussed.

RULE 9 All papers accepted for presentation at a Meeting of the Society shall be passed to the Standing Committee on Publications so that, if desired, publication of papers in full or in abstract may be made in *Mechanical Engineering.* Papers may be presented before Regional or Local Section meetings without being passed upon by the Standing Committee on Meetings and Program or referred to the Committee on Publications, but should be sent to those committees afterwards so that they may be available for presentation at a Meeting of the Society or for publication in *Mechanical Engineering,* if such is desirable. Such papers may be given general release to the technical press after presentation under such release date as will permit of simultaneous publication in *Mechanical Engineering.* If prompt publication in *Mechanical Engineering* is not possible, full release will be given to the technical press by the Standing Committee on Publications.

RULE 10 Papers for presentation at the Annual or Spring Meetings of the Society must be received by the Secretary at the headquarters of the Society at least two (2) months before the date of the meeting at which they are to be presented.

RULE 11 Papers presented at any Meeting of the Society, a Professional Division, a Local Section or a Regional Meeting become the property of the Society and fall under the copyright rule, but may be reprinted by anyone, in part or in full, if the proper credit is given to the author and to the Society.

RULE 12 The Standing Committee on Meetings and Program shall deliver to the Secretary such papers as are selected for presentation to the professional or general sessions of the Society, and he shall have sole possession of papers and illustrations between the time of their approval by the Committee and their presentation to the session.

RULE 13 Members may obtain reprints of papers at a price sufficient to cover the cost to the Society, provided that such copies are not for the purpose of resale. Reprints of papers shall bear the imprint of the Society only.

Article R13, Secretary

RULE 1 The office of the Secretary shall be open on business days from 9 a. m. to 5 p. m.; on Saturdays from 9 a. m. to 1 p. m.

RULE 2 The Secretary shall establish and enforce rules for the conduct of the business of his office.

RULE 3 The Secretary shall have charge of the rooms of the Society and furnishings, the historical relics and objects of art, and shall make suitable recommendations to the Council for their care and use.

Article R14, Funds

RULE 1 The accounts of the Society shall be audited and approved annually by a chartered or other competent public accountant.

RULE 2 The Finance Committee shall hold monthly meetings for the auditing of bills and such other business as shall come before it.

RULE 3 Each year the Finance Committee shall present with its report a detailed estimate of the probable income and expenditures of the Society for the following twelve (12) months.

RULE 4 The Finance Committee shall make recommendations to the Council as to investments, and when called upon by the Council, shall advise upon financial questions.

RULE 5 Any contract or other obligations to pay money in the Society's work, exceeding in amount two hundred dollars ($200), shall be valid only when signed by the Secretary.

Article R15, Professional Practice

RULE 1 The Standing Committee on Professional Conduct, having in charge all matters connected with the Code of Ethics and its enforcement, shall cooperate with similar committees of such other societies as adopt the Code, with the object of carrying out the following procedure:

(*a*) The President of each society cooperating in the Joint Code of Ethics shall appoint a Standing Committee on Professional Conduct to administer the Code of Ethics. The duties of such a Committee shall be to interpret the Code and to render opinions on any cases of questionable conduct on the part of members that may be submitted to the Committee. These interpretations shall be reported to the Executive Board of the Society, which Board may approve these interpretations, or take such other action as may seem just and necessary. The reports of the Committee on Professional Conduct, when approved by the Executive Board, shall be printed in abstract and in anonymous form in the Society's monthly Journal for the instruction and guidance of fellow members.

(*b*) This Committee on Professional Conduct shall be appointed in each society by the President holding office at the time of the adoption of this Code and shall consist of five (5) members, one (1) appointed for five (5) years, one (1) for four (4) years, a third for three (3) years, a fourth for two (2) years, and a fifth member for one (1) year only. Thereafter, the President then holding office shall appoint one (1) member annually to serve for five (5) years, and shall also fill any vacancies that may occur for the unexpired term of the member who has withdrawn. These appointments shall be made from among the older members of the Society, so that advantage may be taken of their mature experience and judgment. After appointment, the Committee shall elect its own chairman and secretary. The Committee shall have power to secure evidence or other information in any particular case not only from the organizations' own members, but if it should seem desirable, from men in other professions. The Committee may also appoint sub-committees to consider certain cases when deemed necessary.

(*c*) This Committee shall investigate all complaints submitted to it by the Secretary of the Society bearing upon the professional conduct of any member and after the member involved has been given a fair opportunity to be heard, the Committee shall report its findings to the Executive Board of the Society. This report may suggest certain procedure of the Executive Board.

(*d*) The Executive Board of the Society shall have power to act on the recommendation of the Committee on Professional Conduct, either (1) to censure by letter the conduct of the member who has acted contrary to the Code, if the breach is of minor character, or (2) to cause the member's name to be stricken from the roll of the Society.

(*e*) Copies of all reports made by a Committee on Professional Conduct to the Executive Board of each society shall be furnished to each other Committee on Professional Conduct administering the Code. This will keep each Committee advised of the interpretations of other Committees, and in time an extended interpretation of the Code can be written based on the reports of the various Committees on Professional Conduct.

(*f*) As interpretations of the various Committees on Professional Conduct administering this Code may vary at times, it is recommended that the Chairmen of these committees of the various societies be authorized to act as a Joint Committee to review such differing interpretations and to bring them into harmony with one another.

RULE 2 The standing Committee on Professional Conduct shall follow the procedure below in considering cases presented to it:

(*a*) Cases for consideration may be:

(1) An interpretation of the code, or

(2) Rendering an opinion on the questionable conduct of a member of the Society.

(*b*) Cases and complaints are to be submitted to the Committee by the Secretary of the Society. If any cases or complaints come directly to the Committee, the Secretary of the Society is to be notified by the secretary of the Committee so that records of the former will be complete.

(*c*) Before a case is submitted to the Committee, the Secretary of the Society shall ascertain whether the person against whom a complaint has been made is a member of the Society, and if possible decide whether the case is of such importance as to be passed on by the Committee, or is of a trivial nature.

(*d*) A case may be submitted by the Secretary of the Society either through the Chairman or the secretary of the Committee, or jointly to each member of the Committee.

(*e*) On receipt of a case the Committee shall decide whether it can best make a finding by correspondence, or by a meeting of the Committee, and whether hearings shall be given to the interested parties.

(*f*) The Committee may appoint sub-committees to consider and report on cases too remote for the main Committee to act upon.

(*g*) All correspondence from members of the Committee should pass through the office of the Chairman or secretary of the Committee and not be sent direct to the Secretary of the Society. In order to facilitate filing and preparation of reports, a letter should cover only one case or subject.

(*h*) Reports and findings on cases shall be sent by the Chairman or secretary of the Committee to the Secretary of the Society for consideration by the Executive Committee or Council of the Society, which may approve the findings or take such other action as may seem desirable or necessary.

(*i*) The Committee may, if it so desires, suggest action by the Executive Committee or Council.

(*j*) Under the plan laid down by the Joint Committee on Code of Ethics, the Executive Committee or Council shall have the power on recommendation of Committee, either (1) to censure by letter the conduct of a member who has acted contrary to the Code, if the breach is of a minor character, or (2) to cause the member's name to be stricken from the rolls of the Society.

Article R16, Amendments to the Constitution

RULE 1 In voting on an amendment to the Constitution the voter shall prepare his ballot by crossing out that part of the amendment which he wishes to vote against. He shall then enclose the ballot in an envelope and seal it, and shall enclose this envelope in a second envelope marked "Ballot on Amendment" and seal it, and he shall then write his name thereon for identification.

RULE 2 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

RULE 3 The Secretary shall certify to the competency and signature of all voters.

RULE 4 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

RULE 5 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers.

RULE 6 The Tellers shall consider a ballot as valid provided the intent of the voter is clear, and provided also that he conforms with the regulations for voting.

Appendices to the Rules

Appendix 1, Research Contributions

(Adopted by Council, May 29, 1923)

By special action of the Council, September 25, 1922, and in accordance with B14, Par. 4, funds may be solicited from sources outside the Society for the conduct of research. The special Rules adopted by the Council are:

(*a*) The Council favors and strongly urges the closest possible cooperation with universities and technical schools qualified and equipped to assist in the development and conduct of special research work.

(*b*) Cooperative, not competitive, methods should be worked out with existing research laboratories and activities in other organizations. Such cooperation could take the form of publication of papers and groups of papers where a definite industry desires to bring to the attention of engineers for the development of the industry, any problem or special research, without commercial bias.

(*c*) Each suggested research must be presented, on its individual merit, for approval by the Council, which will in turn refer the matter to the appropriate authority or committee.

(*d*) Specific requests to the Council are to be accompanied with full details of proposed scope, method of solicitation of funds and budget.

(*e*) No exception shall be made to the Society's being the custodian of all funds, and having complete knowledge and control of the distribution and assignment of such funds, through the Council, with the understanding always that no contributor is to be specially favored on account of any contribution for a research in which he is interested and that such contribution can be received only on the basis of general benefit to the industry.

Appendix 2, Awards and Prizes

(*See also Funds, page 231*)

"AWARDS" are from the Society on the recommendation of the Committee on Awards approved by Council.

"PRIZES" may be established by Professional Divisions, Local Sections or other agency within the Society.

NOTE: It is not obligatory on the Society to bestow any award if the character of the paper or inventions considered does not have the distinction that will warrant general recognition by the engineering profession.

1 HONORARY MEMBERSHIP, only by unanimous vote of the Council, as provided in the Constitution. Candidates for Honorary Membership may be nominated to the Council by not less than twenty-five (25) members. In all cases the grounds upon which the nomination is made must be presented to the Council in writing.

The ordinary procedure in connection with voting upon an Honorary Member is for some one member of the Society or a committee to submit the name informally to all the members of the Council, not for the purpose of obtaining a final vote, but to ascertain whether the final vote will be unanimous or not. The final vote must be by letter-ballot sent out by the Secretary of the Society and one (1) dissenting vote will be a rejection. It is not customary, therefore, to ask for a ballot until after the informal inquiry has been made.

2 A. S. M. E. MEDAL, for distinguished service in engineering and science. This medal may be awarded for general service in science having possible application in engineering.

Any member of the Society presenting the name of an engineer for the award of this medal shall forward a full statement of the grounds upon which the award might be expected, such statement to be published in *Mechanical Engineering*. In no case will this award be made until (1) the invention or improvement shall have been fully described in *Mechanical Engineering* for a period of thirty (30) days, and (2) a favorable recommendation by the Committee on Awards arrived at after the lapse of said thirty (30) days, and (3) a two-thirds vote of the Council at any regular or special meeting. Ordinarily

only one (1) such medal per year will be awarded and that only for inventions and improvements of great merit in the technical and public sense. It is not required that this recipient shall be a member of the Society.

3 MELVILLE MEDAL, instituted and endowed by Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society. To be presented for an original paper or thesis of exceptional merit, presented to the Society for discussion and publication; to encourage excellence in papers and may be presented annually.

4 A JUNIOR MEDAL or monetary award, for the best paper or thesis submitted by a Junior Member, under the rules governing such awards.

5 TWO STUDENT MEDALS or monetary awards, for the best papers or theses submitted by Student Associates, under the rules governing such awards.

6 The Professional Divisions or the Local Sections or any other agency in the Society may establish and award prizes but these prizes shall not be considered as honors bestowed by the Society as a whole and shall be designated as prizes bestowed by the Professional Divisions, or Local Section, or any other agency.

7 HOLLEY MEDAL, instituted and endowed in 1924 by George I. Rockwood, past Vice-President of the Society; to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit; to be awarded under the provisions of the deed of gift as accepted by Council December 5, 1924.

JUNIOR AND STUDENT AWARDS

The following rules govern the distribution of these awards:

Awards for Junior Members

(*a*) The competition for the award shall be restricted to the Junior members of the Society.

(*b*) The award shall consist of a cash amount, with an engraved certificate signed by the President and Secretary of the Society.

(*c*) The award shall be bestowed for the paper, adjudged from the standpoints of originality of matter, applicability (practical or theoretical), and value as a contribution to mechanical engineering literature, logical development of contents, conclusiveness, completeness and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance, and shall not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society during the year of the competition shall not be construed as making a paper ineligible.

(*e*) The papers considered shall include all papers presented to the Society by Junior members during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendation to the Council on or before October 1; the findings of the Committee shall be final. The award shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in *Mechanical Engineering*.

Awards for Student Associates and Enrolled Students

(*a*) The competition for the awards shall be restricted to Student Associates and Enrolled Students in good standing.

(*b*) The two awards bestowed each year shall each consist of a cash amount with an engraved certificate signed by the President and the Secretary of the Society.

(*c*) The awards shall be bestowed for two papers, adjudged from the standpoint of applicability (practical or theoretical), and value as a contribution to mechanical engineering literature, completeness, originality of matter, and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance and shall not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society or by any of its Student Branches during the year of the competition shall not be construed as making a paper ineligible.

(*e*) The papers considered shall include papers submitted by Student Associates in competition during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendations to the Council on or before October 1; the findings of the Committee shall be final. Awards shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in *Mechanical Engineering*.

Funds Available

The attention of our members is called to the following funds already established and available to carry out some of the awards granted by the Society.

(*a*) $1000—A gift from a member of the Society, the income to be awarded annually for a paper of exceptional merit by a Junior Member, as provided in the Rules.

(*b*) $1000—A gift from a member of the Society, the income to be awarded annually for the two papers of exceptional merit by members of the Student Branches, as provided in the Rules.

(*c*) $1000—A bequest from Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society, the income to be placed in the form of a gold medal, to be presented for an original paper or thesis of exceptional merit presented to the Society for discussion and publication. (See Item 3, page 230.)

(*d*) $2500—A gift from Charles T. Main, Past-President of the Society, the income to be awarded annually for the encouragement of research, good papers, or other activity for the advancement of engineering by any member of the Society. This may take the form of a medal or of a cash prize. Furthermore, it may be given in addition to any other award at the discretion of the Council.

(*e*) The Holley Medal, instituted and endowed in 1924 by George I. Rockwood, past Vice-President of the Society; to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit. (See also Item 7, page 230.)

(*f*) $15,000—A gift from Major Max Toltz, for assistance to students.

(*g*) John R. Freeman Fund, for Travel Scholarships.

INDEX TO CONSTITUTION, ETC.

Abbreviations for use of members....R3(3)
Accounts, audit of....R14(1)
See also Bills; Funds
Administrative committees....B8(6); B8(16 *et seq.*)
reports....R8(1)
Affiliation of Local Sections....R11(11)
Affiliation of Society with other organizations....
C2(1); B2(1); B8(33), (34); R2(1)
termination of....R2(5)
Amendments to By-Laws....B1(1)
changes in order of numbering....B1(3)
Amendments to Constitution....C16; B16; R16
changes in order of numbering....C16(2)
method of presentation and ballot....C16; B16; R16
obligation of members....C3(4)
tellers on....B16(1), (4)
Amendments to Rules....B1(2)
changes in order of numbering....B1(3)
American Engineering Council delegates....B8(36)
chairman of delegation....R8(3)
American Engineering Standards Committee
sectional committees, representation and reports....
B8(7), (42), (43), (44); R8(2)
Annual Meeting....C9(1)
adjournment of....B9(1)
business of....R6(8)
date of....C9(1)
election of nominating committee at....See Nominating Committee
papers for....B9(9)
place of....B9(1)
quorum....B9(3)
responsibility for conducting....B9(8)
Application for membership....C4; B4(1); R4
See also Membership
Appropriations, annual....B14(11)
Arrears of dues....B5(1), (3), (4), (5), (6), (7), (8), (11)
Art objects....R13(3)
A. S. M. E. Medal....B8(23); Rules, Appendix 2
A. S. M. E. News....See Publications
Associate, grade of
annual dues....C5(2)
initiation fee....C5(1)
references for....R4(1), (5)
requirements for grade of....C4(4)
Associate-Member, grade of
annual dues....C5(2)
initiation fee....C5(1)
references for....R4(1)
requirements for grade of....C4(5)
Authors, rules for....R12(2)
Awards and Prizes....Rules, Appendix 2
See also Funds; Honorary Membership; Life Membership
Awards committee....B8(23); Rules, Appendix 2

Badge (emblem)....R3(4)
Ballots, ruling on
amendments to constitution....C16; B16; R16
candidates for membership....R4(8), (9)
delegates American Engineering Council....B8(36)
directors and officers....B7(5), (6), (7); R7(1), (2), (3)
honorary membership....B4(5); Rules, Appendix 2 (1)

Ballots, ruling on (*cont.*)
life membership award....B5(10)
ordered at meetings....B9(6)
rulings on preparation and legality....R7
special questions....B8(4)
tie in....B7(10)
Bank account....B14
Bequests....B14(6), (7)
See also Awards
Bills
against the Society....B14(5)
contracts for and limitations....R14(5)
mailing and collecting....B5(5); B14(2)
Boiler Code Committee
appointment and duties....B8(7), (30)
Budget....B14(11)
See also Finance Committee
Business manager....R13(2)
See also Secretary
Business relations of members....C15
See also Code of Ethics
Business Session....R6(8)
rules of order....B1(5)
By-Laws
amendments to....B1(1)
changes in numbering....B1(3)

Certificate of membership....R3(1)
Charter....C1(2)
Code of Ethics....C15(1); B15
interpretations....R15
Codes, approval or adoption of....C15(3)
See also Professional Committees
Commercial use of Society's name....C15(4)
Committees....See name or class of committee
appointment....B8(5-8), (11), (16 *et seq.*)
chairman of, election....B8(12)
duties of....B8(9)
expenditures by....B8(6), (7); B14(11)
reports and procedure....R8
special....B8(7), (8)
termination of membership....B8(8), (10), (13)
Constitution
amendments to....See Amendments
members subject to....C3(4)
supersedes all previous rules....C16(3)
violation of....C15(2)
Constitution and By-Laws Committee....B8(22)
Contracts to pay money....R14(5)
Cooperation with other bodies....See Affiliation
Copyright....B2(4); R12(11)
Council, Directors and Officers....C7-C8
action on applications for membership..C5(3), B4(1), R4(6), (8), (9)
annual report....C8(4)
committees of....B8(5 to 32)
delegation of powers of....C7(7)-C11
duties of....C8
See also Expenditures; Funds
election and notification of....C7(3); C9(1); B7; R7
eligibility for office....B7(3)(13); B8(1)
executive committee....B8(5)
letter-ballots, may order....B8(4)
membership, approval of acts of....B8(3)
number of....C7(2); B7(11), (12)
powers of....C8(1); B8(1), (3)
quorum....C8(3); B8(2)

Council, Directors and Officers (*cont.*)
reelection ..... B7(13)
Secretary, member of ..... B13(2)
terms of office of ..... C7(4)
tie in election ..... B7(9)
Treasurer, member of ..... B7(17); C(7)
vacancy in office or committees ..... C8(2); B8(1)
Delegates
American Engineering Council ..... B8(36)
Local Sections conference ..... R6(2); R11(8)
See also Honorary Vice-Presidents
Directors ..... See Council
Dues
annual ..... C5(2); B5(1)
arrears ..... B5(1), (3 to 8), (11), (12)
Enrolled Students ..... R11(40)
exemption from ..... C5(4); B5(11); R5(2)
include publications ..... R12(1)
Student Associates ..... R5(1)

Education and Training for the Industries Committee ..... B8(6), (25)
Education, engineering, fostering C2
Election of officers C7
tie in ..... B7(10)
See also Balloting; Council
Election to membership ..... See Membership
Eligibility for office ..... B7(3), (13); B8(1)
Emblem (badge), use of ..... R3(4)
Engineering Foundation Board
representatives, nomination of ..... B8(38)
Ethics, code of ..... C15(1); B15
See also Professional Practice
Executive Committee of Council
appointment and personnel ..... B8(5)
Expenditures
budget ..... B14(11)
committees ..... B8(6); (7); B14(11 to 16); R14
Council approval ..... B14(11 to 16)
ordered at meetings ..... C9(5)
See also Finance Committee; Funds

Fees and dues C5; B5
Finance Committee
appointment and duties ..... B8(6), (16); R14
See also Expenditures; Funds
Formulas, approval of ..... C15(3)
Freeman, John R., Fund ..... See Funds, Rules, Appendix 2
Funds C14; B14
as awards ..... Rules, Appendix 2
deposit, disbursement and investment ..... C14(1); B7(17); B14
research, solicitation of ..... Rules, Appendix 1
reserve ..... B14(3)

Gifts and bequests ..... B14(4)(6), (7)
See also Awards
Government bureaus, cooperation with ..... B8(34)
Grades of membership C4

Holley medal ..... Rules, Appendix 2, (7)
Honorary membership ..... C4(2)
as Society award ..... Rules, Appendix 2
ballot and election of ..... B4(5)
nominations for ..... B4(4), Rules, Appendix 2, (1)
number of ..... B3(1)
qualifications ..... C4(2)
Honorary Vice-Presidents ..... B8(33)

Impeachment ..... B8(3)
Initiation fees ..... C5(1)
payable ..... B5(1)
reserve account, deposited in ..... B14(3)
Investments ..... C14(1) ; B7(17) ; B14(1-10) ; R14(4)
for research ..... Rules, Appendix (1)
Treasurer's relation to ..... B7(17)

John Fritz Medal Board of Award
representatives on ..... B8(39)
Junior award ..... Rules, Appendix 2
Junior, grade of
age limit ..... C4(6)
annual dues ..... C5(2)
initiation fee ..... C5(1)
references ..... R4(2)
requirements for grade of ..... C4(6)

Library ..... B2(1)
Committee and Board, United Engineering Society ... B8(6), (26), (37)
Secretary, member of Board ..... B8(26)
Life membership ..... C5(3)
award for special services ..... B5(10)
purchase of ..... B5(9)
Local Sections and Committee ..... C11 ; B11
affiliation with other societies ..... R11(11)
appointment and duties ..... B8(6), (21) ; B11(7)
by-laws, individual, of section ..... R11(13)
chairman may attend standing committee meetings ..... R11(5)
conference, Annual Meeting ..... R6(2) ; R11(8)
cooperation with Professional Divisions ..... R11(10)
disbanding or suspension ..... R11(14)
executive committees ..... B11(5) ; R11(3)
expenditures ..... R11(7), (8)
limitations ..... B11(4), (7)
meetings ..... See Regional Meetings
nominating committee districts and selection ..... R6(1 to 8)
objects ..... B11(1)
organization of ..... C11 ; B11(2), (3) ; R11(1)
prizes ..... Rules, Appendix 2
regional and joint meetings ..... B11(6) ; R11(15 to 23)
representation at Annual Meeting ..... R11(8)
secretaries ..... R11(6)
stationery to be uniform ..... R11(9)
voting ..... R11(4)

Main, Charles T., Fund ..... Rules, Appendix 2
Managers (Council member) ..... C7(2)
number and term of service ..... C7(4) ; B7(12)
requirements for ..... B7(3)
Mechanical Engineering ..... See Publications
Medals ..... Rules, Appendix 2
Meetings and Program Committee
appointment and duties ..... B8(6), (17)
duties and responsibility for regional meetings ... B9(10) ; B11(6) ; R12
Meetings of the Society C9, B9
annual ..... C9(1) ; B9(1)
conduct of non-professional features ..... R9(3)
conduct of professional sessions ..... R9(2)
date of announcing ..... B9(7) ; R9(1)
expenditures ordered—restrictions ..... C9(5)
letter ballot ordered ..... B9(6)
notice of ..... B9(7) ; R9

Meetings of the Society (*cont.*)
papers, presentation of....B9(9); R9(4); B12(8)
quorum at....C9(4); B9(3), (4), (5)
regional....B9(10)
registration fees....B14(5)
responsibility for....B9 (8), (10); R9
semi-annual....C9(2); B9(2)
special....C9(3); B9(5), (8)
Melville Medal....Rules, Appendix 2
Member, grade of
annual dues....C5(2)
initiation fee....C5(1)
references for....R4(1)
requirements for grade of....C4(3); R4(1)
Membership....C3
abbreviation for grades....R3(3)
annual report on....C8(4)
application for....C4; B4(1); R4
assignment to....B4(3)
certificate....R3(1)
election to....C4(1); B4(4); R4
emblems....B3(4)
expulsion from....C15(2)
See also Code of Ethics
grades of....C3; C4; B4(3); R11(38)
See also Membership
Local Sections relations....R4(4); R11(4), (5)
obligations of....C3(4); B15(1)
privileges of....C3(2)(3)
Professional Divisions, relation to....B10(2)
qualifications for admission and references....C4; B4; R4(1), (2), (3)
references, lacking....R4(3)
reinstatement to....B5(12)
Membership Committee....B8(19)
appointment and duties....B4(6); B8(6), (19); R4(6)
destroys correspondence....R4(7)
receives applications....R4(4)
reports to Council....R4(6)
Membership List....See Publications

Name of Society and use commercially....C1(1); C15 (4)
National Research Council
representatives on nomination of....B8(41)
Nominating Committees
alternates....B6(2)
composition of....B6(1)
election of....C6(1); B6; R6(8)
nomination of, through Local Sections groups....R6(1) *et seq.*
publication of names on....B6(2)
report from, requirements....B7(1), (2), (4)
special....C6(2); B6(5); B7(4)
terms of service....B6(1), (2)
vacancy in....B6(4)
Nominees for office....See Council, Balloting, Nominating Committee, etc.

Objects of the Society....C2(1)
means of accomplishing....B2(1)
Office (headquarters)....C1(2)
of the Secretary, hours of....B13(3); R13(1)
Officers....See Council
Organization of Society....C1(2), (3)

Papers....B12(8)
awards and prizes for....Rules, Appendix 2
Council directs issue of....C12(1)
disposition of....B12(8); R12 (2) *et seq.*

Papers (*cont.*)
publicity ..... B2(2)
reprints for members ..... R12(13)
responsibility for statements in ..... B2(3)
sources of ..... R12(2)
See also Meetings of the Society; Publications
Past-Presidents, as directors ..... C7(2)
Power Test Codes Committee ..... B8(7), (31)
President
absence of, representative ..... B7(16)
chairman of delegation to A. E. C. ..... R8(3)
committee appointments ..... B8(11), (34)
conduct of meetings ..... R9(2)
duties of ..... B7(15); B8(8), (11); B16(1); R11(30)
requirements for ..... C7(2); B7(3)
term of ..... C7(4)
vacancy in office of ..... C8(2)
Prizes by local sections or professional divisions ..... Rules, Appendix 2 (6)
Professional committees ..... B8(7), (8), (27 *et seq.*)
reports ..... R8(2)
Professional Conduct Committee ..... B8(8), (32)
joint action with other societies R15
procedure in cases R15
See also Professional Practice, Code of Ethics
Professional Divisions and Committees ..... C10; B10(1), (2), (4); R10(1 to 9)
awards ..... Rules, Appendix 2
committees ..... B8(6), (20); B10(6)
grouping, relation to publications ..... B12(4)
organization of, and executive committee ..... B10(3 to 6)
registration in ..... B10(2)
Professional groups ..... B10(7); R10(10-12)
Professional practice
approval of reports, etc ..... C15(3)
code of ethics ..... C15(1); B(15); R15
use of Society's name ..... C15(4)
violation of Constitution ..... C15(2)
Professional relations of members ..... C15(1)
Property of Society, report on ..... C8(4)
Proxy of voting member ..... B3(2); R3(2)
Publications and papers ..... C12(1); B12(8); R12
A. S. M. E. News ..... B12(6)
income from ..... B12(1)
Mechanical Engineering ..... B12(5)
meetings announcement ..... R9(1)
Membership List ..... B12(7)
Record and Index ..... B12(2), (3)
contents of ..... B12(2)
responsibility for ..... B12(1)
subscription prices ..... R12(1)
Transactions ..... B12(4)
contents of B12
corresponding with Professional Divisions ..... B12(4)
Year Book ..... See Membership List
Publications Committee
action on papers ..... B12(8); R12(2 *et seq.*)
appointment and duties ..... B8(6), (18)
responsibility for papers ..... See papers
Publicity ..... B2(2), (3), (4)

Qualifications for admission to membership ..... See Membership
Quorum
at meetings of Society ..... C9(4); B9(3), (4), (5)
of Council ..... C8(3); B8(2)
Record and Index ..... See Publications
Reelection to office ..... B7(13)

References of candidates for membership
correspondence confidential regarding ..... R4(7)
See also Membership; Membership Committee
Regional meetings ..... B11(6); R11(15 to 23)
Meetings Committee, relation to ..... B9(10)
Registration fees ..... B14(5)
Reinstatement to membership ..... B5(12)
Relations with Colleges
Committee appointment ..... B8(6), (24)
responsibility for Student Branches ..... B8(24); R11(37)
Remission of dues ..... C5(4); B5(11); R5(2)
Reports
annual required ..... C8(4); B14(8); R8
approval of ..... C15(3)
procedure ..... R8(1), (2)
publication of ..... C8(4); B12(2)
See also Standards
Representation of Society ..... B8(33), (34)
Reprints of papers ..... See Papers
Research Committee ..... B8(8), (28)
Research, contributions to ..... Rules, Appendix 1
Reserve account ..... B14(3)
Resignations ..... B3(3); R3(5), (6)
Rooms of the Society ..... R13(3)
Rules
adoption of ..... B1(2)
amendments to ..... B1(2)
changes in order of numbering ..... B1(3)
Rules of Order
Robert's ..... B1(5)

Safety Committee ..... B8(8), (29)
Scholarships ..... Rules, Appendix 2
See also Funds
Secretary
appointment of ..... C13(1)
business manager ..... R13(2)
charge of rooms (etc.) ..... R13(3)
delegation of duties of ..... C7(7)
duties ..... C7(7); C13(2); B13; B14; R4(8), (9); R13(2)
funds and expenditures B14
removal of ..... B13(4)
reports on finances ..... B14(8), (12)
salary of ..... B13(5)
vacancy in office of ..... C13(3)
Secretary's office, hours of ..... R13(1)
Sectional committees of American Engineering
Standards Committee ..... See Amer. Eng. Stand. Comm.
Semi-annual (Spring) meeting ..... C9(2)
See also Meetings
Seniority in office ..... C8(2); B7(16); B8(1)
Special committees ..... B8(8)
reports of ..... B8(15); R8(1), (2)
Spring (semi-annual) meeting ..... C9(2)
See also Meetings
Standardization Committee ..... B8(8), (27)
Standards, approval or adoption ..... C15(3)
Standing Committees ..... B8(8)
chairmen have seat on Council ..... B8(8)
president fills vacancies in ..... B8(11)
reports of ..... B8(14); R8
Student awards ..... Rules, Appendix 2
Student Branches ..... R11(24 *et seq.*)
application for ..... R11(24)
appointment, Honorary Chairmen ..... R11(30)

Student Branches (*cont.*)
relations with Committee on Relations with Colleges.....B8(24)
responsibility for .....R11(37)
Student funds .....See Funds, Rules, Appendix 2
Student membership
associate .....R11(24e)
dues .....R11(39), (40)
enrolled student .....R11(38a, b), (39), (40)
requirements for .....R11(24 to 40)
See also Student Branches
Subscription rates of Society publications.....See Publications

Technical Committees .....See Professional and Special Committees
Tellers, appointment of.....B16(1)
term of office.....B16(4)
See also Balloting; Voting
Tie in elections.....B7(10)
Toltz, Max, fund for students.....Rules, Appendix 2
Transactions .....See Publications
Treasurer .....C7(6)
absence of .....B7(18)
appointment of .....C7(6)
duties of .....B7(17)
term of .....C7(6)
Treasurer's bank .....B14(1)

United Engineering Society
election trustees .....B8(35)

Vacancy in office.....C8(2); B8(1)
Vice-Presidents
act as President.....B7(16)
as directors .....C7(2)
honorary .....B8(33)
requirements for .....B7(3)
number and term of service.....C7(4); B7(11)
Voting .....C3(3)
decision in .....B1(4)
Local Sections .....R11(4)
proxy .....B3(2); R3(2)
rights of a member.....B5(8)
tie in .....B7(10); B16(3)
See also Balloting

Western Society of Engineers, Washington Award
appointment of representatives on.....B8(40)

Year Book .....See Publications (Membership List)

NECROLOGY

Robert W. Allerton

Robert W. Allerton, field engineer since 1923 for the Worthington Pump and Machinery Corporation, died on July 13, 1927, in Detroit, Mich. He was born in 1884 at Middlebury, Conn., and was educated at the Sheffield Scientific School, Yale University. He entered the employ of the Henry R. Worthington Hydraulic Works, Brooklyn, N. Y., in January, 1902. His apprenticeship was in the testing room in Brooklyn, and from there he was promoted to the position of superintendent of erection on outside work, which he held until 1923, when he was assigned to the position covering research work, in which he was engaged at the time of his death.

Mr. Allerton became a member of the A.S.M.E. in 1913.

Bert Bare

Bert Bare was born in San Francisco, Calif., in 1888, and died in Philadelphia, Pa., July 17, 1927. He was graduated from the University of California in 1914 with the degree of B.S. From 1915 to 1917 he was machinist apprentice and draftsman for the Dow Pump & Diesel Engineering Co., Alameda, Calif. From 1917 to 1919 he was chief engineer and draftsman for the Pacific Oil Engineering Company, and assisted in the design of semi-Diesel engines of the Skandia type and later of the Werkspoor type. During 1919, 1920, and 1921 he held the position of Diesel engine designer for the Southwark Foundry and Machinery Corporation, the New London Ship and Engine Company, and the Worthington Pump and Machinery Corporation, at Cambridge. In 1922 Mr. Bare became engineer in charge of Diesel drafting at the Bessemer Gas Engine Company, Grove City, Pa., where he designed engine governors, compressors, and oil engines. For the two years before his death he had charge of the drafting and layout work on solid-injection Diesels as well as the engineering calculations entering into the design.

Mr. Bare became a member of the A.S.M.E. in December, 1917.

Charles W. Barnaby

Charles W. Barnaby, consulting engineer, and for many years chief draftsman of the Staten Island Shipbuilding Company, Port Richmond, N. Y., died at his home on August 26, 1927. Mr. Barnaby was born at Salem, Ohio, March 28, 1853, and was educated in the Ohio public schools. In 1870 he became associated with the Buckeye Engine Company, at Salem, Ohio, and remained in their employ for ten years as apprentice and journeyman. He was then promoted to the position of chief draftsman of the same company but in 1888 joined the staff of the Jenny Electric Company, Indianapolis, Ind., where he remained for a year. He went to St. Louis and for over a year assisted in the installation of the Municipal Electric Light and Power Company. In 1890 he returned to steam-power engineering as superintendent of the Phoenix Iron Works, Meadville, Pa.

In 1900 Mr. Barnaby became mechanical engineer for the Mongolia Mines Company. This position was held until he became mechanical engineer with the American Engineering Company, Chicago, Ill., two years later. In 1903 Mr. Barnaby held a similar position with the Atmospheric Products Company of New York and Niagara, N. Y. The C. W. Hunt Company of Staten Island employed him as designer and estimator from 1904 to 1908. From that time Mr. Barnaby was employed in general engineering work and for the past fifteen years was designer and draftsman for the Staten Island Shipbuilding Company. He became a member of the A.S.M.E. in 1884.

Frederick William Bayne

Frederick William Bayne was born at Lakewood, Ohio, August 16, 1899. He attended the Lakewood High School and entered the Case School of Applied Science in the fall of 1918. After graduation in 1922, he went to Yale for two years on a teaching fellowship where he received his M.S. and M.E. degrees. In the fall of 1924 he became an instructor of thermodynamics and heat engines in the Mechanical Engineering Department of the Case School of Applied Science. In 1926 he took a position as mechanical engineer in the lubrication laboratory of the Development Department of the Standard Oil Company of New Jersey. He remained there until his death on April 27, 1927.

Mr. Bayne became a junior member of the A.S.M.E. in 1923.

Horace A. Beale, Jr.

Horace A. Beale, Jr., died September 7, 1927. He was born at Hibernia, Pa., February 10, 1870, and was educated at the Hill School, Pottstown, and at Haverford College. After his graduation from Haverford, he became chemist for the Pennsylvania Steel Company, Steelton, where he remained until 1893, when he was elected vice-president of the Parkesburg Iron Company, Parkesburg, Pa. He became president of this concern in 1900, and continued in this position until his death.

Mr. Beale became a member of the A.S.M.E. in 1915. He was also a member of the American Institute of Mining and Metallurgical Engineers.

Bruce W. Benedict

Bruce W. Benedict was born at Buda, Ill., December 19, 1876. He was graduated from the Crete, Neb., high school in 1893 and from the University of Nebraska in 1901 with the degree of B.S. in mechanical engineering. He received his M.E. degree from the same university in 1923. From 1895 until 1897 he was machinist apprentice of the C. B. & Q. Railway, and in 1901 was made mechanical inspector. He advanced through various positions to the post of general foreman. In 1908 he became supervisor of shop production for the A. T. & S. F. Railway. During Mr. Benedict's time in this office the Santa Fé Railroad was engaged in a pioneer experiment of shop reorganization based on the principles of management.

In 1912 Mr. Benedict became director of shop laboratories at the University of Illinois. During the World War he served in the Field Artillery and later in the Tank Corps. In 1919 he returned to the University of Illinois as manager of shop laboratories and held this position at the time of his death on November 21, 1927. He contributed many articles to technical publications and was co-author of the "Railway Shop Up-to-Date," with M. H. Haig, and of "An Investigation of Twist Drills," with W. P. Lucas. He was the author also of the building code for the City of Champaign and of the Manual of Reconnaissance, Tank Corps, U. S. A.

He was a member of the Society for the Promotion of Engineering Education and of the Society of Industrial Engineers. He became a member of the A.S.M.E. in 1912.

Per Torsten Berg

Per Torsten Berg was born in Sweden, July 29, 1853, and died at his home in Sweden, May 14, 1926. He was graduated as a mining and metallurgical engineer from the Technical University of Stockholm in 1878. The next year he came to the United States and became a workman in the Edgar Thompson plant of the Carnegie Steel Company. He was soon transferred to the drafting room and was advanced to the position of chief draftsman. In 1889 he was made chief mechanical engineer of the Homestead Steel Works. He held this position until 1902 when he resigned to return to Sweden. For

a number of years he retained his connection with the American steel industry as the representative for Europe of the United States Steel Corporation.

In 1909 Mr. Berg was made vice-consul-general of America in Stockholm, and later became honorary American vice-consul. Mr. Berg was one of Mr. Carnegie's junior partners and a member of the Carnegie Veterans' Society. He was a member of The American Institute of Mining and Metallurgical Engineers, The British Iron and Steel Institute, honorary member of The American Society of Swedish Engineers, honorary doctor of Augustana College, honorary member of The Swedish American Society of Stockholm, vice-president of The Swedish American Foundation, and member of The Swedish Engineers Society. He was also a director of several industrial enterprises in Sweden. He became a member of the A.S.M.E. in 1890.

Frank K. Blair

Frank K. Blair was born at Williamsport, Pa., February 8, 1889, and died there October 29, 1927, after a long illness. He was graduated from the Williamsport high school, and from Rensselaer Polytechnic Institute with the degree of E.E. in 1911. His first position was with the Pennsylvania State Highway Department as transitman and chief of level party on surveys for improved roads. He then became associated with the Westinghouse, Church, Kerr & Co., New York, N. Y., as assistant engineer on the construction of a six-story concrete manufacturing building. When this was completed in 1912 he went to Toronto, Ont., as mechanical draftsman and later assistant to the mechanical engineer on the rehabilitation of the Toronto Electric Light Company's steam plant, including the addition of a turbine and auxiliaries, boilers, and piping. In March, 1914, he went to London as construction engineer on the remodeling of the London Electric Light Company's steam plant, which included the changing over of the distribution system from 120 to 60 cycles; the installation of new generators, a new 155-hp. engine with condensers, piping, and a coal handling and water purifying system; and the building of a new engine room.

On his return to this country in March, 1915, Mr. Blair accepted a position as field engineer on bridge construction with Busch & Stewart, Williamsport, Pa. In December of that year he became resident engineer on the construction of a large foundry and machine shop for the Seneca Falls Manufacturing Company. He severed his connection with this concern in April, 1916, to become engineer on valuation of mechanical equipment and real estate for the D. & H. R. R. Co., Albany, N. Y. The following year he became associated with the Turner Falls Power & Electric Co., Greenfield, Mass., as mechanical draftsman on the design of a 30,000-kw. steam generating station. He also served as assistant construction engineer on the installation of all equipment. In August, 1918, he was appointed mechanical engineer for the Fall River Electric Light Company in charge of all new work pertaining to the generating station; supervision of tests and studies to increase plant efficiency as well as studies and reports on rates. His work at the plant included changing over the boiler room from coal-burning to oil-burning, and enlarging the boiler room generally. At various times he contributed articles to the technical press.

He became a member of the A.S.M.E. in 1922.

Joseph H. Brady

Joseph H. Brady was born at Savannah, Ga., July 10, 1854, and died July 16, 1927, at Kansas City, Mo. When he was 17 he went to Kewanee, Ill., where he served his apprenticeship as heating and ventilating engineer. Later he joined a Boston concern and was sent by them to New Mexico, Nebraska, and Kansas on various projects. In 1882 he went into business for himself at Kansas City, Mo., and in 1886 was put in charge of the heating and plumbing of the schools there. Three years later he became chief engineer

of the school system, the position he held at the time of his death. Mr. Brady secured a number of patents, most of them related to improvements in equipment used in schools.

He became a member of the A.S.M.E. in 1907.

Benjamin N. Broido

B. N. Broido, chief engineer of the Industrial Department of The Superheater Company, of New York and Chicago, died February 10, 1927, at his home in New York. He was known throughout this country and abroad as an exceptionally able designer of steam superheaters and heat-exchange apparatus. He was, in fact, recognized as a leading authority on the subject of superheat, and in recent years many intricate problems were referred to him for solution.

His entire life was devoted to the subject of superheat and allied subjects. He derived his greatest pleasure in realizing the fulfillment of ideals he had set for himself. Some of the best-known power stations in this country — Hell Gate, Fordson, East River, Crawford Avenue, Sherman Creek — and many others, including some abroad, contain evidence of his handicraft. He had filed more than seventy-five patent applications in this country and abroad for boilers, superheaters, economizers, heat exchangers, pipe stills, etc.

A striking feature of Mr. Broido's career is that so much was crowded into such a short space of time. He was born at Vilna, Russia, in January, 1879. His early education was obtained in Russia and Germany, and he was graduated in 1904 from Frederick's Polytechnic, Gothen, Germany, with a degree in mechanical engineering. For the next two years he was an instructor at the Polytechnic.

From 1906 to 1912 Mr. Broido was connected with the Aschersiebener Maschinenbau A.G., Aschersleban, Germany, as acting head of the department. Realizing that in order to design superheaters properly he must first be thoroughly familiar with stokers and boilers he next became connected with Hannoversche Maschinenbau A.G., Hannover, Germany, where he developed a new design of Stirling boilers to better suit them to conditions in that country.

Mr. Broido first came to America in 1914. Handicapped by lack of money and knowledge of the English language, he found it very difficult to secure a position and to realize his ambition to design steam power generating equipment. He took a post-graduate course in the City College of New York and in Columbia University. Later he became connected with the Roessler & Hasslacher Chemical Co., Perth Amboy, N. J., for whom he designed power plants. In 1917 he was engaged by the Philadelphia & Reading Railway Co., to design a power and creosoting plant, and joined the Superheater Company later in that year. He became consulting engineer for that company in 1922 and in 1924 was given the position of chief engineer.

As a member of The American Society of Mechanical Engineers, he took an active part in steam power-plant work, and was the author of many papers presented at its meetings. He also was a frequent contributor to the technical press.

Mr. Broido became a member of the A.S.M.E. in 1920. He was also a member of Verein Deutscher Ingenieure, the Engineers' Club of Philadelphia, and Raritan Lodge No. 61, F. & A. M.

David W. Brunton

David W. Brunton, who died December 13, 1927, at Rochester, Minn., where he had gone for an operation at the Mayo Clinic, was born at Ayr, Canada, in June, 1849. He received his grade school education in Toronto and was graduated from the University of Michigan in 1871. His first position was with the Toronto & Nepissing Railroad for a period of two years. In 1873 he came to the United States and was identified with a bridge and construction company in Buffalo, N. Y. Two years later he went to Colorado as engineer with the Dakota, San Juan Mining Company of Colorado. In 1876

he joined Hunt, Douglas & Stewart, Georgetown, Colo., as engineer, and later in the same year became engineer for the Clear Creek Reduction Works. From 1877 to 1880 he was with the Silver Peak Mining Company, Silver Peak, Colo., first as engineer and later as manager.

In 1880, with T. M. Taylor, he formed the firm of Taylor & Brunton, metallurgists and mining engineers. This company was active at the time of his death. Mr. Brunton identified himself with the pioneer mining industry of Colorado and became connected with some of the largest tunneling and mining projects of the West. During recent years he had confined his practice solely to consultation work. He contributed many articles to the technical press. He was author of "Tunneling," a book which is used as part of engineering curricula both here and abroad. During the War he was chairman of the war committee of the technical societies, and he also served as a member of the naval consulting board of the National Research Council of the World War and was associated with the inventions division of the general army staff.

Mr. Brunton had about thirty patents to his credit. The best known of these, though perhaps not the most important, are the time-sampling machine and the Brunton pocket transit. The time-sampling machine has practically revolutionized the methods of sampling precious metal ores. The Brunton transit was invented to meet the need of a small, portable, accurate instrument for reconnaissance work in surface and underground surveying. Two thousand of these instruments were in use at the Front during the War, and since the termination of the War, they have been adopted as standard equipment for United States engineer troops.

Mr. Brunton was president of the American Institute of Mining and Metallurgical Engineers for two terms and president of The American Mining Congress. He was a member of the Institution of Civil Engineers, The Royal Geographic Society, The American Society for the Advancement of Science, and The Colorado Scientific Society. He became a member of the A.S.M.E. in 1913 and at the time of his death was representing this Society on the American Engineering Council.

He was awarded the Telford medal and life membership in the Institution of Civil Engineers in London, England, in 1898, and was given a gold medal by the miners employed in driving the Cowenhoven Tunnel in 1893. In 1927 the William L. Saunders medal for outstanding achievement in the mining industry was awarded to Mr. Brunton in recognition of his vast experience and accomplishments in the United States, Europe, South America, Mexico, and Japan. His last service of note to the state of his adoption was in connection with the chairmanship of consulting engineers to the Moffat Tunnel Commission, which position he filled from the time of its inception to the time of his death, a period of six years.

Rudolf E. Bujarski

Rudolf E. Bujarski, mechanical engineer for the Forstmann & Huffmann Co. of Passaic, N. J., died on January 21, 1927, at the age of 42 years. He was born in Stettin, Germany, received his early education at the Gymnasium of his native city, and was graduated from the Technische Hochschule at Charlottenburg with the degree of M.E. From 1904 to 1919 Mr. Bujarski was employed by various construction, furniture, and engineering companies as an apprentice, equipment engineer, tool and instrument maker, designer, maintenance engineer, and research and consulting engineer. From 1919 until his death Mr. Bujarski was associated with Forstmann & Huffmann Co., manufacturers of woolens, in charge of their engineering department, supervising the building and repair of machinery for finishing woolen goods, and designing special machines not sold on the market. He became an associate member of the A.S.M.E. in 1923.

Anson W. Burchard

Anson Wood Burchard, vice-chairman of the Board of Directors of the General Electric Company, chairman of its Executive Committee, and chairman of the Board of Directors of the International General Electric Company, died January 22, 1927, as the result of an attack of acute indigestion.

Mr. Burchard was born at Hoosick Falls, N. Y., on April 21, 1865. He was graduated from high school there and entered Stevens Institute of Technology, from which he was graduated in 1885 with the degree of M.E.

His first position was with the J. M. Ives Co., where he was engaged in general factory engineering at Danbury, Conn. In 1891 he became treasurer and manager of the T. & B. Tool Co., Danbury, a position he held until 1900, when he became vice-president of the Cananea Consolidated Copper Company. In 1902 he joined the General Electric organization and until 1904 was comptroller of the company with headquarters at Schenectady. In 1904 he was made assistant to the president and in 1912 a vice-president. In 1917 he became a member of the Board of Directors and in June of 1922 was elected president and chairman of the Board of Directors of the International General Electric Co. Early in 1926 he relinquished the duties of president of the I.G.E. Co. but continued as chairman of the Board. During the War he acted as assistant to Benedict Crowell, director of munitions.

Mr. Burchard's counsel was sought by numerous interests outside the immediate sphere of his activity, particularly in the field of electric-power development, abroad as well as in this country. He was a director of several electrical and utility companies and a member of many societies representing electrical and power interests.

In cooperation with Charles A. Coffin, he was active in the development of the financial structure of public-utility companies and in the consolidation of many manufacturing units of the General Electric Company.

With the passing of Mr. Burchard, industrial America lost one of its outstanding figures. With an extraordinary talent for organizing and with the training of an engineering education he was particularly adapted to become one of the leaders in upbuilding the electrical industry.

He became a member of the A.S.M.E. in 1888.

Thomas W. Capen

Thomas Wells Capen died at Benton Harbor, Mich., on March 30, 1927. He was born at Dorchester, Mass., in 1842, and was graduated from Cooper Institute in 1868. After serving as mechanical engineer for the Gates Iron Works, Chicago, Ill., and the Allis-Chalmers Company, Milwaukee, Wis., for 16 years, he retired from active business.

His early positions were held with the Stover Machine Works, New York, N. Y.; the Morgan Iron Works, New York, N. Y.; Hay & Capen, New York, N. Y.; General George B. McClellan, Hoboken, N. J.; Yale & Towne Manufacturing Co., Stamford, Conn.; Grant Locomotive Works, Paterson, N. J.; Fraser & Chalmers, Chicago, Ill.; and Heckenburg, Waite and Hathaway, Winamac, Ind.

Mr. Capen had been a member of the A.S.M.E. 44 years at the time of his death.

Donald Pershing Carter

Donald Pershing Carter was born at Pottsville, Pa., September 21, 1881, and died at Montclair, N. J., December 18, 1927. He received his early education at Chestnut Hill Academy, Philadelphia, and was graduated from Cornell University in 1904 with a degree in mechanical engineering. He served his apprenticeship with Niles-Bement-Pond Company, New York, N. Y., doing machine-shop work in four of their plants manufacturing machine tools. In 1905 he entered the employ of the Ingersoll Rand Company, Phillipsburg, N. J., as inspector and in charge of piece work in the machine shop manufacturing air compressors. In 1907 he joined the B. F. Sturtevant Co., Hyde Park, Mass., as erecting superintendent. In 1916 he was given the position

of engineer in charge of installation of heating, ventilating, and mechanical equipment of schools, hospitals, mining, and industrial plants, for the B. G. Carpenter Co., Wilkes-Barre, Pa. He remained there until the entrance of the United States into the World War, when he was commissioned first lieutenant of the Ordnance Department, Washington, D. C. Later he was made captain of the Chemical Warfare Service, Baltimore and Edgewood, Md.

After his discharge from service Mr. Carter became sales engineer in charge of the Baltimore office of the Massachusetts Blower Company, Watertown, Mass., handling heating and ventilating apparatus and steam specialties. In 1920 he entered the employ of The Foundation Company as mechanical engineer supervising design. The following year he became associated with Clyde R. Place, designing mechanical equipment for office buildings and power and industrial plants. From 1922 until the time of his death he was a member of the sales department of the W. W. Sly Manufacturing Co., Cleveland, Ohio, as district manager of the New York territory. In this capacity he handled the entire line of foundry equipment and dust arresters, assisting customers in the general arrangement and application of equipment.

He became a member of the A.S.M.E. in 1920.

Albert A. Cary

Albert A. Cary was born at Worcester, Mass., July 26, 1859, and died in New York City, August 31, 1927. He was educated at the Thomas Hunter public school and Worcester Polytechnic Institute. In 1893 he took charge of the drafting room and was given supervision of plant operation of the Metropolitan Iron Works, New York. From 1894 to 1901 he was associated with Cary & Moen, New York, starting as draftsman and advancing to general manager of the plant. In 1901-1902 he was consulting engineer of the Wheeler & Wilson Manufacturing Co., Bridgeport, Conn., manufacturers of sewing machines. From 1902 to 1909 he was engineering manager and in charge of the sales department of the Abendroth & Root Manufacturing Co., New York. In 1909 he started business for himself as consulting mechanical engineer, making a specialty of furnace design, steam power-plant equipment, and the design and installation of the mechanical equipment of manufacturing plants.

Mr. Cary became a member of the A.S.M.E. in 1889.

Harry W. Champion

Harry W. Champion was born at Philadelphia, Pa., in 1864, and died at Philadelphia, March 13, 1927. He was educated at the Germantown Academy and served his apprenticeship at the Newton Machine Tool Works. He advanced through the machine shop, drawing room, and designing department to the position of president of the company. He was also vice-president of the Consolidated Machine Tool Corporation of America and president of the Auxiliary Fire Alarm Company.

He became a member of the A.S.M.E. in 1904.

George W. Childs

George Wesley Childs, designer in the employ of the Panghorn Corporation, Hagerstown, Md., died on May 14, 1927. He was educated in the public schools of Baltimore, Md., and his apprenticeship and shop experience were acquired with Poole and Hunt, now known as the Poole Engineering and Machine Co., Baltimore.

In March, 1896, he was appointed draftsman in the Ordnance Division of the War Department and was stationed at the Sandy Hook Proving Ground. In August of that year he was promoted to the position of draftsman in charge of sea-coast artillery matériel and nine months later was made draftsman in charge of both sea-coast and mobile artillery matériel. He resigned from the War Department in 1909 and entered the Navy Department, remaining there three years. For four years he was associated with the Thurlow Works of

the American Steel Foundries, at Chester, Pa.; at the time of his resignation he occupied the position of works engineer.

Mr. Childs contributed a great deal of material to the technical press. He became a member of the A.S.M.E. in 1920 and was also a member of the Junior Order of United American Mechanics.

William L. Church

William Lee Church, president of the Uni-Form Company, Boston, Mass., died at Newton Centre, Mass., on May 25, 1927.

Mr. Lee was born at Hamilton, N. Y., on March 25, 1850. After attending Colgate University for a short time, he entered Rensselaer Polytechnic Institute at Troy, N. Y., from which he was graduated in 1872. He was connected with the Westinghouse, Church, Kerr & Co., in New York, N. Y., and later with Lockwood, Greene & Co., of Boston. For a considerable time he was president and consulting engineer of the Ambursen Hydraulic Construction Company, Boston, where he was a major influence in establishing hollow dams. In 1916 he was employed as consulting engineer of Wm. Andrews, Inc., N. Y., and in 1918 became president of the Uni-Form Company.

Mr. Church became a member of the A.S.M.E. in 1880 and served as manager from 1884 to 1887.

Morris R. Collins

Morris Rolfe Collins was born January 17, 1904, at Haslett, Mich., and died September 29, 1927. He was graduated from Michigan State College with a B.S. degree in 1926. Upon graduation he entered the employ of the Edison Power Company at Trenton, Mich., where he was employed at the time of his death. He became a junior member of the A.S.M.E. in October, 1926.

Bernard A. Conlin

Bernard A. Conlin was born June 20, 1901, in Chicago. His parents later moved to LaGrange, Ill., where he was graduated from the high school in 1920. He entered the University of Illinois and was graduated with the degree of B.S. in mechanical engineering in June, 1924. He entered the service of the Chicago, Burlington & Quincy Railroad Co., September 28, 1924, as assistant on a special staff in the operating vice-president's office, in charge of maintenance and design of stationary power plants and heating systems. In June, 1926, he was given charge of this staff and continued in this position until his death, September 14, 1927. Mr. Conlin became a junior member of the A.S.M.E. in 1924.

Frederick F. Couch

Frederick Frelinghuysen Couch, development engineer with the Western Electric Company, Chicago, Ill., died on July 15, 1927. He was born at Carbondale, Pa., on November 25, 1887, and was graduated from Lehigh University with the degree of M.E. in 1909. Upon graduation he spent two years as a mechanical designer with the Pennsylvania Railroad at Altoona, Pa. From 1911 to 1920 he was engaged in the teaching of mechanical engineering at Rutgers University, New Brunswick, N. J., starting as instructor and finally becoming associate professor in mechanical engineering. From 1920 to 1923 he held the position of development engineer with the Brunswick-Kroeschell Company, and from 1923 to 1926 he was connected with the Federated Engineering Development Corporation, as chief engineer.

Mr. Couch became an associate member of the A.S.M.E. in 1918 and was promoted to the grade of member in 1920.

Grant A. Covell

Grant A. Cóvell, who for nineteen years was dean of the School of Engineering at Oregon State College, was born at Bradford, Pa., in August, 1862. At twenty-one he entered Cornell University where he worked his way through a four-year course in engineering. In spite of time spent in working for his board and room, he succeeded so well in his studies that he was twice awarded the Hiram Sibley prize for exceptional work in engineering, once winning first place and once second. Following his graduation he was appointed instructor at Cornell, going from there to a similar position at the University of Minnesota, and then to Oregon State College in 1889. When he took over the work at Oregon there was not even one building devoted to engineering education, although the foundation for a small structure had been started. During Dean Covell's régime one building after another was added until, at the time of his death, there were seven buildings devoted to engineering education, comprising one of the finest plants among institutions of its kind. In 1907 the work in engineering was definitely organized into a school with Professor Covell as dean. He continued in active charge until May, 1927, when he was made dean of graduate work in engineering and director of a newly established engineering station. He died November 20, 1927.

Dean Covell was a member of the Society for the Promotion of Engineering Education and of the honorary fraternity, Sigma Xi. He became a member of the A.S.M.E. in 1916.

Harry N. Covell

Harry N. Covell, general manager of the Virginia Alberene Corporation, Schuyler, Va., died on May 6, 1927, at Charlottesville, Va. He was born at Troy, N. Y., on March 25, 1862, and was graduated from the Sheffield Scientific School of Yale University in 1883. Shortly thereafter he entered the employ of the Yale and Towne Manufacturing Company, Stamford, Conn., where he worked in the machine shop, drafting room, and iron foundry. He became connected with the Lidgerwood Manufacturing Company, Brooklyn, N. Y., in September, 1889, as assistant superintendent; in 1897 he was promoted to the position of superintendent, and in 1910 to works manager. He held this position until April, 1925, at which time he entered the employ of the Virginia Alberene Company.

Mr. Covell became a member of the A.S.M.E. in 1891. He and the late A. J. Caldwell organized the National Metal Trades Association, in which Mr. Covell held the positions of treasurer, vice-president, and president, at various times. He was a member of the Administration Council of the National Founders Association for five years, and a director of the American Mutual Liability Insurance Company of Boston, Mass., since 1917. He was a charter member of the Yale Engineering Society, and was one of their past-presidents. Mr. Covell was also interested in the Machinery Club, and was a member of the board of governors of that organization. In 1914 he was made secretary-treasurer of the American Boiler Manufacturers' Association, which position he held at the time of his death.

Charles W. Crawford

Charles Wesley Crawford was born February 2, 1836, at Pittsburgh, Pa., and died September 1, 1927. As a young man he was associated with the Fort Pitt Foundry and during the Civil War he manufactured guns and cannon. He was chief engineer for steam boats plying on the Ohio and Mississippi Rivers in the days when Mark Twain was operating on the river. Later Mr. Crawford established successfully the Crawford-McCrimmon Co. of Brazil, Indiana, manufacturers of coal-mine machinery, equipping a most modern plant in 1913. Mr. Crawford was responsible for the development and improvement of machinery and devices used in mining. He retired from active business in 1913.

He became a member of the A.S.M.E. in 1905.

Carl L. Dingens

Carl Louis Dingens, superintendent of the American Pad and Paper Company, Holyoke, Mass., died on April 30, 1927, at his home in Holyoke. He was born in Buffalo, N. Y., on March 22, 1873, and was a graduate of Cornell University, class of 1896. Mr. Dingens also attended Canisius College in Buffalo, N. Y.

Upon leaving the university, he obtained employment with the Buffalo Street Railway Company as motor inspector and repairer, and in 1898 he superintended construction and general installations for the Syracuse Construction Company, Syracuse, N. Y. Mr. Dingens was manager of the New York Branch of the A. Hussey Leaf Tobacco Co.; treasurer of L. P. Sutter & Bros., Inc.; treasurer and general manager of the Bigelow Binder Company, New York, N. Y.; and was in charge of the cost department and general systematizing and efficiency work with the National Blank Book Company. In 1912 he became associated with the American Pad and Paper Company, where he was located at the time of his death.

He became a member of the A.S.M.E. in 1920.

William E. Dodds

William E. Dodds was born August 14, 1869, and died of a heart attack while on a steamship on Lake Huron en route from Buffalo to Duluth, August 14, 1927.

Mr. Dodds was educated at the University of Wisconsin, graduating with the class of 1882. After graduation he was employed by the E. P. Allis Co. of Milwaukee, as draftsman and erecting engineer until 1888, when he went to Reading, Pa., as superintendent of the Reading Iron Company. In 1893 Mr. Dodds returned to Milwaukee to associate again with the E. P. Allis Co., later becoming manager of the steam-engine department. When the E. P. Allis Co. became the Allis-Chalmers Company, Mr. Dodds continued with it. In 1907 he went to Bristol, Pa., as general manager of the Standard Cast Iron Pipe and Foundry Company where he remained until he retired from active business in 1920.

Mr. Dodds became a member of the A.S.M.E. in 1891. He was also a member of the American Academy of Political and Social Science, the Manufacturers' Club of Philadelphia, chairman of the finance committee of the Bristol Borough Council, and manager of the Board of Directors of the Bristol Free Public Library.

Courtney C. Douglas

Courtney C. Douglas, engineer in charge of turbine sales, Chicago office, General Electric Company, died suddenly October 31, 1927. He was born at Fontana, Lake Geneva, Wis., December 27, 1880. His education was obtained at Beloit College Academy and the University of Wisconsin, from which he was graduated in 1903. In July of the same year he entered the employ of the General Electric Company at Schenectady where he gained experience in the calculating department and later in installation. From these departments he went to the steam turbine department where he was closely associated with the early development of the turbine. In 1908 he was transferred to the Boston office of the company in charge of construction and three years later, in 1911, he went to the Chicago office in charge of turbine sales. For years he was regarded as one of the foremost authorities on steam turbines in his territory.

He became a member of the A.S.M.E. in 1913. He was also a member of the Western Society of Engineers.

Jesse T. Duryea

Jesse T. Duryea was born at Manhassett, N. Y., November 11, 1865, and died January 30, 1927. He was educated in the public schools and at the Bellevue Hospital Medical College, from which he was graduated in 1889.

After graduation he held various executive positions in hospitals. In 1896 he was appointed general medical superintendent of all public hospitals in Brooklyn and Queens. Included in his duties was the supervision of all engineerng and construction work. In 1903 he was made president of the Colwell Lead Company, and in 1914 he became president of Pierce, Butler & Pierce and subsidiaries.

Mr. Duryea became an associate of the A.S.M.E. in 1921.

Frank I. Ellis

Frank I. Ellis was born at Melbourne, Australia, June 13, 1863, and died January 16, 1927, at Pittsburgh, Pa. His engineering apprenticeship was served at Melbourne. He left there to attend the World's Fair in Chicago and stayed in this country as chief draftsman for the Frank Kneeland Machine Company, which was the nucleus of the combine now known as the United Engineering & Foundry Co. Mr. Ellis was assistant and later chief engineer of this company until 1914, when he became associated with the Mark Manufacturing Company, later with the Jones & Laughlin Steel Co., and finally, until the time of his death, he served as consulting engineer for several branches of the steel industry. Mr. Ellis was one of the leading tube-mill authorities in the country. He built many tube mill and plant projects, among them the pipe mill for the Jones & Laughlin Steel Co., and a steel plant for the International Nickel Company, at Huntington. At the time of his death, he was preparing to build one of the largest seamless tube-mill installations, a project which has been carried on by others since.

Mr. Ellis became a member of the A.S.M.E. in 1907.

Harold F. Ely

Harold F. Ely was born in Brooklyn, N. Y., January 4, 1880. He was graduated from the Brooklyn Manual Training High School and then entered Purdue University, at Lafayette, Ind., from which he was graduated with a B.S. degree in mechanical engineering in 1899. In 1900 he received his M.E. in mechanical engineering from Cornell University. He spent one year in the drafting room of the New York Shipbuilding Company, Camden, N. J., and then entered the employ of the British Westinghouse Company, Manchester, England, as assistant to the superintendent of the turbine and engine department, where he remained until 1904. He then returned to this country and joined the engineering staff of the Westinghouse, Church, Kerr & Co., New York City, as assistant engineer on steam power plant design and construction. In 1907 he became a member of the firm of the Elliott Bay Iron Works, Seattle, Wash., manufacturers of water-tube boilers. In 1909 he joined the General Electric Company at Schenectady, N. Y., making layouts for the mechanical design of direct-current generators, motors, and exciters. In 1910 he became designer of condensers and pumps for the Alburger Pump Works, Brooklyn, N. Y., where he remained until the Westinghouse Machine Company started the condenser department, when he joined their engineering staff as designer and engineer at the East Pittsburgh Works. In 1920 he was transferred to the South Philadelphia plant as technical manager of the condenser engineering department, the position he held at the time of his death, June 9, 1927. In 1908, Mr. Ely worked up and secured a patent on a water-tube boiler.

He became an associate member of the A.S.M.E. in 1915.

John E. Ericson

John Ernst Ericson at the time of his death on April 16, 1927, was city engineer of the city of Chicago. He held this position since 1897. For the four years previous to that time he was first assistant city engineer.

Mr. Ericson was born in Sweden on October 21, 1858, and in 1880 was graduated from the Royal Polytechnic Institute at Stockholm, as civil engineer. After serving his apprenticeship in Sweden he came to America, where he held various positions of responsibility. From 1881 until 1892 he was employed

as resident engineer of the T.C. & St.L.R.R.; bridge designer of Hopkins & Co., St. Louis, Mo.; instrument man, U. S. Government Surveys, Illinois and Michigan Canal; draftsman, water office, City of Chicago; assistant engineer, bureau of engineering, Chicago; assistant chief engineer, Seattle water supply; assistant engineer, Sanitary District of Chicago; and assistant engineer, bureau of engineering, City of Chicago.

Mr. Ericson, beside being a member of the A.S.M.E. since 1909, was a member of the A.S.C.E., Western Society of Engineers, honorary member of the Swedish Engineers' Society of Chicago, and honorary member of the John Ericcson Memorial Engineers' Society of New York. He was decorated by the king of Sweden in 1909 with the Royal Order of Vasa, and in 1911 received the Octave Chanute Medal from the Western Society of Engineers. He made a number of contributions to the technical press.

John B. Fallon

John Bernard Fallon, at the time of his death on February 25, 1927, was treasurer of the Stickney & Poor Spice Co., Boston, Mass., having held that position since 1911.

Mr. Fallon was born in Boston in 1879 and when 18 years of age became associated with the Stickney & Poor Spice Co. In 1899 he installed the power-plant machinery, and the new spice-grinding machinery, and in 1903 designed and built the prepared-mustard machinery for this firm. Later he inaugurated a new cost system. Mr. Fallon became a junior member of the A.S.M.E. in 1905.

Dudley Farrand

Dudley Farrand, vice-president of industrial relations of the Public Service Corporation of New Jersey, died at Fair Haven, N. J., on March 3, 1927. He was born at Bloomfield, N. J., on February 21, 1869, and after graduation from the Newark Academy, he became associated with the Newark Electric Light and Power Company. Later he was made assistant secretary and then assistant manager in charge of the operating department. In 1897 Mr. Farrand was made general manager of the Peoples Light and Power Company and in 1899 general manager of the United Electric Company of New Jersey. When the Public Service Corporation of New Jersey was formed in 1903, Mr. Farrand was made general manager of the electric department, and in 1910 when the Public Service Electric Company was organized he was appointed general manager; five years later he assumed the additional duties of vice-president. In 1917 he was made assistant to the president of the Public Service Corporation of New Jersey, continuing in that capacity until 1923, when he was appointed to the position which he held at the time of his death. He was president of the Newark Safety Council and past-president of the National Electric Light Association, and was a mmeber of the A.I.E.E., A.S.M.E., Engineers' Club, Franklin Institute, and Society of Professional Engineers of New Jersey. He became affiliated with the A.S.M.E. in 1895.

L. Edward Farrell

L. Edward Farrell, chief draftsman of the Power Specialty Company, New York, N. Y., died on January 19, 1927. He was born in Staten Island in July, 1898, and was graduated from Pratt Institute in 1914. Upon leaving Pratt Institute Mr. Farrell was in charge of the drafting and shop work of the Winkler Iron Company. The next year found him in the employ of Purdy and Henderson. He spent 1916 designing electric-furnace apparatus for Thornton W. Price and designing and checking mechanical and structural apparatus for coke plants. From 1917 to 1922 he worked with the Stewart M. Marshall & Charles Perin Co., receiving a broad experience in their employ. In 1922 he became affiliated with the Power Specialties Company. Mr. Farrell became an associate member of the A.S.M.E. in 1921.

Emile J. Fermier

Emile J. Fermier was born in Indiana, October 7, 1869, and died at Bryan, Texas, December 19, 1927. He received his B.S. degree from Valparaiso University, and a B.S. degree in mechanical engineering from Purdue University in 1895. From 1887 to 1891 he was an instructor in public schools. In 1891 he went to Purdue University as tutor and remained there until 1895 when he went to a private school for boys at Detroit, Mich., as instructor in manual training and mathematics. In 1898 he joined the faculty of the Western Military Academy as teacher of science and mathematics. In 1901 he was instructor at the Oak Park School, Oak Park, Ill. From 1902 until 1906, he was instructor at Purdue University, leaving there to become assistant professor at the A. & M. College of Texas as head of the department of mechanical engineering. He held this position until his death. He was appointed vice-dean of the School of Engineering in 1926. In addition to his duties as head of the department of mechanical engineering, Professor Fermier was also director of the Engineering Experiment Station in 1922. He held this office until 1926. During Professor Fermier's time of office the department of mechanical engineering grew from an enrollment of fifty-three students to one of two hundred and fifty-seven students.

He served both in the Spanish-American War and in the World War. In the former he was assistant engineer in the U. S. Navy, and during the latter he was actively engaged in he training of mechanics and artisans.

He was a member of the S.P.E.E., the A.A.A.S., and of the Prime Movers' Committee of the Southern Geographical Division of the N.E.L.A. He became a member of the A.S.M.E. in 1908.

Sydney Fisher

Sydney Fisher was born at South Ockendon, England, September 17, 1889, and died in Philadelphia, Pa., October 16, 1927. He was educated in the public schools of New York City, and was graduated from Columbia University in 1914 with the degree of E.E. He entered the employ of the Engineering Supervision Company, New York, N. Y., where he remained for a year. In February, 1915, he joined the Remington Arms & Ammunition Co., Bridgeport, Conn., in charge of motive power equipment and plant testing. In 1917 he became associated with the Bridgeport Brass Company, as research, development, and process engineer, first in the mill products division and later in the fabricating division. In 1925 he was made chief engineer of the fabricating division in charge of estimating, drafting, development, and process engineering, which position he held at the time of his death.

He was a member of the Engineers' Club of Bridgeport, and of the A.I.E.E. He became a member of the A.S.M.E. in 1916.

Warren M. Fiske

Warren M. Fiske, superintendent of the Rasgao Construction Company, Sao Paulo Tramway Light and Power Co., Ltd., Caixa Do Correioa, Sao Paulo, Brazil, S. A., died in Brazil on April 3, 1927. He was born in Brooklyn, N. Y., on December 4, 1893, and was educated in the public schools of New York, N. Y., and Toronto, Canada. He was a graduate of Phillips Academy, Andover, Mass., and was graduated with the class of 1915 from Tufts College.

In September, 1915, Mr. Fiske was apprentice electrical engineer at the Western Electric & Manufacturing Co., East Pittsburgh, Pa. Leaving this company in February, 1916, he became a sales representative of the R. B. Phillips Manufacturing Co. in Portsmouth, N. H., and remained with this company until June of the same year. In July, 1916, he became assistant engineer to Warren H. Fiske of New York, N. Y., in whose employ he remained until May, 1917. He had a splendid record in the army and at the close of the World War was Captain in the 314th Field Artillery. Upon leaving the Army he became connected with the New York Telephone Company, New York, as traffic instructor, but early in 1920 joined the Texas Company as a student

lubricating engineer where he studied for two years. From May, 1922, to February, 1923, he was in charge of all mechanical and electrical construction for the Tepexic Plant of the Mexico Light and Power Company, Mexico. Later in the same year Mr. Fiske was employed by the Parahyba Hydroelectric Generating Station of the Brazilian Hydroelectric Company, Rio de Janeiro, Brazil, in complete charge of all electric construction in the power house.

Upon leaving this company he had complete charge of all electrical and mechanical construction of the Rasgao Hydroelectric Generating Station with the Sao Paulo Tramway Light and Power Company, Ltd., Sao Paulo, Brazil. In September, 1925, he was made superintendent of construction at the same plant and held this position at the time of his death. Mr. Fiske became a junior member of the A.S.M.E. in 1920 and was promoted to the grade of associate member in 1926.

Thomas J. Fitzgerald

Thomas J. Fitzgerald was born in January, 1869, at Springfield, Mass., and died September 1, 1927. He was graduated from the Springfield schools in which he took special courses in machine design, mechanical drawing, and mathematics. His early practical shop experience was with the Boston & Maine Railroad on locomotive work. Later he went to the Pratt & Whitney Co. to work on machine tools, and shortly after to the Warrick & Overman Steel Co. as a tool maker. For four years he was employed by the Merritt & Densmore Typewriter Co. as tool and gage maker.

From 1893 to 1897 Mr. Fitzgerald was employed at the U. S. Springfield Armory, Springfield, Mass., on equipment for a new model rifle and as tool and gage maker, inspector, and adjuster of machines, fixtures, and tools. In 1897 he was put in charge of the machine tool, and maintenance departments, including the power plant, and the production department on bayonet scabbards, swords, repairs, and modifications of machine guns. During this period he assisted in designing, and supervised the making and installation of special machinery and gages for model 1903. He designed and made the present windage device now used on model 1903 rifles and on all machine guns. He also made all fixtures and tool equipment, equipped and adjusted machines ready for operation, and shipped to Rock Island Arsenal a complete rifle plant for model 1903. In 1909 he was appointed head of the engineering, planning, and drafting departments with supervision of all designing, tools and machines, maintenance, costs, routing schedules, methods of manufacturing, ordering and testing of materials, supply procurement, estimating and rate setting. He designed, developed, made and installed the equipment, and supervised the production of the Colt automatic pistol, model 1903, machine rifle, 3-in. shrapnel shells, case heads, and a variety of ordnance matériel, machine gun parts, and experimental rifles.

In 1919 Mr. Fitzgerald went to the Eddystone Rifle plant of the Midvale Steel and Ordnance Company as equipment engineer. In 1918 he was appointed to the position of chief engineer with full supervision of equipment design, methods of manufacture, and schedules and of all investigations for the purpose of eliminating waste and increasing production. In 1920 he was appointed works manager of the Sturdi-Truck Company, Holyoke, Mass. In 1921 he went into business for himself under the name of the Fitzgerald Forging and Heat Treating Company, Springfield, and was actively connected with this concern until his death.

He became a member of the A.S.M.E. in 1916.

Robert Forsyth

Robert Forsyth, consulting engineer, died September 11, 1927, in Chicago, Ill. He was born at Troy, N. Y., September 28, 1849, and was graduated from Rensselaer Polytechnic Institute, Troy, in 1869, with the degree of C.E. His professional experience was entirely in connection with the design, construction, and operation of iron and steel works. Upon graduation, he spent several

years as draftsman at the Bessemer Steel Works, Troy; was made assistant superintendent of the Bessemer Steel Works, North Chicago Rolling Mill Company, in 1872; and became superintendent of the same company, January 1, 1873.

Later he became manager of the Union Steel Company, and from 1889 to 1896 was chief engineer and second vice-president of the Illinois Steel Company. From 1896 until his death he was a consulting engineer in iron and steel matters.

Mr. Forsyth was a member of the American Institute of Mining Engineers, the American Society of Consulting Engineers, and the British Iron & Steel Institute, and an honorary member of the American Iron and Steel Institute. He became a member of the A.S.M.E. in 1918.

Robert M. Fotheringham

Robert Monteith Fotheringham, associated with the Linde Air Products Company and consulting engineer of Buffalo, N. Y., died on May 8, 1927. Mr. Fotheringham was born in Glasgow, Scotland, on August 26, 1858, and was graduated from Mechanics Institute and Anderson University, Scotland. He served his apprenticeship as designing marine engineer under the noted engineer, A. C. Kirk, and was also in the employ of the Scotch firms of Fairfield Shipbuilding and Engineering Works; Robert Napier & Sons of Glasgow; and James and George Thomson. His work was in connection with the designing and testing of ships for the merchant marine and Royal Navy.

He came to the United States in 1892 and was made chief engineer of the Lake Erie Engineering and Boiler Works, Buffalo, N. Y. In 1899 he became chief draftsman with the Snow Steam Pump Works of Buffalo. He stayed with this company until 1907 when he was made chief engineer of the Titusville Iron Company, Titusville, Pa. While with this company he accomplished successfully the feat of synchronizing two 400-hp. gas engines driving generators for the Titusville Electric Light & Power Co., a task never before accomplished. Upon leaving this company in 1912 he was made superintendent of John Inglis & Co., of Toronto, Canada. He returned to the United States in 1914 to become general manager of the Lake Erie Boiler Works, Buffalo, N. Y. In 1916 he designed and patented the contour buffing machine and prepared plans for a shipyard for the Empire Engineering Corporation. From 1917 to 1919 he designed the Linde four-stage crank and flywheel compressor for the Linde Air Products Co., and from 1919 to 1924 was president of the Contour Buffing Machine Co., Inc., Buffalo, N. Y. In 1923 Mr. Fotheringham designed the four-stage oxygen compressor for the Linde Air Products Company. At the time of his death he was designing compressors of 3000 lb. capacity and at the same time doing research and experimental work for the company.

Mr. Fotheringham became a member of the A.S.M.E. in 1926 and was also a member of The American Society of Naval Engineers.

James W. Furlow

Col. James Wadsworth Furlow, U.S.A., retired, died at Pittsburgh, Pa., March 4, 1927, and was buried with full military honors from the post chapel at Fort Meyer, Va., in the Dewey section of the Arlington National Cemetery. Colonel Furlow was born at Americus, Ga., August 4, 1872, and was educated at the Georgia School of Technology and at West Point Military Academy. He was in active military service from June, 1894, until October, 1924, when he was retired on account of disability. He was attached at various times to the cavalry, infantry, signal corps, and the Philippine scouts, but the greater part of his service was in the motor transportation department of the Quartermaster Corps. In the punitive expedition into Mexico he operated the first motor-truck train organized in the army and afterward assisted in organizing motor transport shops. He was awarded the distinguished service medal for "the organization and highly successful operation of motor vehicles during the World War." Following his retirement,

Colonel Furlow was employed by the United States Chain & Forging Co., at Pittsburgh, Pa., as special agent.

He was a member of the Society of Automotive Engineers and became a member of the A.S.M.E. in 1920.

George W. Galbraith

George Washington Galbraith, manager and sales manager for the Worthington Pump and Machinery Corporation, Cincinnati, Ohio, died on June 1, 1927.

Mr. Galbraith was born in Cincinnati, Ohio, in July, 1859. At the age of 14 he entered the machine shop as apprentice. After serving in this capacity for some time he entered the Ohio Mechanics Institute and was graduated from that institution. He received his shop experience with several firms, among them being the Lane and Bodley Company. From 1885 to 1894 he was employed by Jung Brewing Company, Cincinnati, as engineer and later as chief engineer. He was associated with the Southwark Foundry and Machine Company from 1895 to 1896 and the Phoenix Iron Works Company, Meadville, Pa., from 1897 to 1898.

Mr. Galbraith held his last position for 27 years, having been appointed in 1900 when the present company was known as the Laidlaw-Dunn-Gordon Works of the International Steam Pump Company. Mr. Galbraith was very active in the affairs of the Engineers' Club of Cincinnati, having been a director in 1920 and president in 1923. He became an associate of the A.S.M.E. in 1899.

Edward V. Gartner

Edward V. Gartner was born in New York, N. Y., February 20, 1903, and died at Yonkers, N. Y., November 18, 1927. He attended the New York public schools, and in 1924 he received his B.S. degree in mechanical engineering from New York University. He then entered the employ of the Otis Elevator Company, Yonkers, N. Y., in their training course. At the time of his death he was employed in the Works Department of that company.

He became a junior member of the A.S.M.E. in 1925.

William P. Gerhard

William Paul Gerhard, consulting sanitary engineer of Scarsdale, N. Y., died at Lake Winnewaska, N. Y., on July 8, 1927. Mr. Gerhard was born in Hamburg, Germany, in 1854, and was graduated from the Polytechnic School of Carlsruhe, Baden, Germany, in 1875, with the degree of doctor of engineering. He was connected with many German organizations previous to the time he came to this country in 1877. He was in the drawing room of the Imperial German Navy Yard at Keil; assistant engineer to the railroad engineer in Hamburg; and had one year's service in the German Railroad Regiment at Berlin. He came to the United States and settled in St. Louis, where he was almost immediately appointed assistant engineer of the department of public works. A few years later he went to Newport, R. I., as chief assistant to Col. George B. Waring and since that time had made his headquarters in New York, N. Y.

Mr. Gerhard became a member of the A.S.M.E. in 1904.

Hugh Glen

Hugh Glen was born March 25, 1869, at Kilbarchan, Scotland. He was educated at Glasgow Technical College. He served an apprenticeship of five years with John Lang & Sons, engineers and iron founders, Johnstone, Scotland, leaving them in 1891 to go to the Thompson shipbuilding yard. In 1895 he came to the United States and was employed by the Prosser Construction Company, St. Louis, on railroad construction. In 1900 he entered

the employ of the Pittsburgh Plate Glass Company, Crystal City, Mo. In 1910 he became assistant master mechanic of this firm and in 1912 was made master mechanic. In 1918 he went with the Union Electric Light & Power Co., St. Louis, as master mechanic. Later he was made manager of the National Plate Glass Company, Saginaw, Mich., the position he held at the time of his death, in April, 1927.

He became a member of the A.S.M.E. in 1920.

John M. Goodell

John M. Goodell, former editor of the *Engineering Record* and associate editor of the *Engineering News*, died on June 21, 1927.

Mr. Goodell was born in Worcester, Mass., on August 3, 1867, and was educated at the Worcester Polytechnic Institute, from which he was graduated in 1888 with the degree of B.S. in Civil Engineering. Two years later he joined the staff of the *Engineering News* as an associate editor, leaving after two years to become an associate editor of the *Engineering Record*. In 1895 he became assistant secretary of the American Society of Civil Engineers, leaving that position in 1897 to return to the *Engineering Record*.

After five years of editorial work Mr. Goodell joined the staff of Joseph H. Wallace as resident engineer on paper-mill construction at Sault Ste. Marie. Within a year, however, he returned to the *Engineering Record* as editor. He retired in 1912 but later helped to establish the American Highway Association, becoming greatly interested in highway construction and organization work.

During the war he was production manager and later employment manager of the Emergency Fleet Corporation. He also served the National Highway Council. Mr. Goodell was consulting engineer for the Bureau of Public Roads; in charge of publicity for the Babcock & Wilcox Co.; and an editor of the *Journal of the American Waterworks Association*. He became a member of the A.S.M.E. in 1921.

William Goodman

William Goodman, vice-president of the Worthington Pump and Machinery Corporation, died on April 21, 1927, at the age of 53 years. Mr. Goodman was well known for the development of the new two-cycle double-acting Diesel engine and the feather-valve air compressor.

He was born at Cincinnati July 8, 1874, and was graduated from Haverford College in 1895 and Harvard University in 1896. He entered the engineering department of the Laidlaw-Gunn-Gordon Co., Cincinnati, Ohio, which was later absorbed by the Worthington Pump and Machinery Corporation. He became general manager of the Cincinnati plant and in 1918 was transferred to the New York office as assistant to the vice-president, becoming vice-president in 1922.

In the Spanish-American War he served as an ensign in the navy and in the World War was in charge of the manufacture of munitions at the Worthington plant in Hazleton, Pa.

Mr. Goodman became a junior member of the A.S.M.E. in 1900 and was elected a member in 1916. He held membership in various clubs of Cincinnati and New York.

Robert R. Goodrich

Robert Rhea Goodrich was born in Hartford, Conn., April 18, 1864. He received a B.S. degree in mining engineering in 1885, in mechanical engineering in 1901, and M.S. in electrical engineering in 1902 from the Massachusetts Institute of Technology. He received a Ph.D. in metallurgy from Columbia University. He served as mining engineer and manager of collieries in the Pocahontas coal fields and Elk Ridge colliery. From 1896 to 1898 he was mining engineer and superintendent of the Helena Mining Company, Chichuahua, Mexico, the last ten months as superintendent. He was appointed head of the Mining and Metallurgy Department, and was in charge of the Bureau of

Mines and Assaying at the University of Arizona. Later he became professor of metallurgy and research at the University of Idaho, and was acting professor of metallurgy, spring quarter, 1918, Stanford University, Calif. At the time of his death, August 10, 1927, he was chief chemist of the phosphate department, Washose Smelter, Anaconda Copper Mining Company, Anaconda, Mont., and was also interested in mining and milling in the Southern Cross, Mont., district. Mr. Goodrich was the author of several pamphlets and articles appearing in trade journals dealing with various phases of mining and metallurgy.

He became a member of the A.S.M.E. in 1903. He was a life member of the American Institute of Mining and Metallurgical Engineers.

John R. Gray

John R. Gray was born in Mississippi, August 27, 1882. He received a public school education at Crowley, La. His first position was with the People's Independent Rice Mill at Crowley, where he advanced to the position of superintendent of milling activities. In 1911 he became superintendent of the Louisiana State Rice Milling Company, which was a consolidation of practically all rice milling in Louisiana with main offices at New Orleans. In 1915 he entered the employ of a private milling firm owned by A. Kaplan, of Crowley, La., and J. A. Sabatier, Iota, La. He designed and rebuilt the Iota Rice Mill and the Federal Mill at Crowley, and held the position of superintendent and general manager of these plants and their various interests until 1919, when he went to San Francisco to open an office as consulting engineer and dealer in mill supplies. His work consisted of the building of plants throughout California for the cleaning and storing of various grains, and of feed, flour, and rice mills. He also built three rice mills and one flour mill in the State of Sonora, Mexico. He died September 21, 1927.

Mr. Gray became a member of the A.S.M.E. in 1915.

Lewis Gustafson

Lewis Gustafson, superintendent of the David Ranken Jr. School of Mechanical Trades, St. Louis, Mo., died at his home in St. Louis, August 30, 1927. He was born in November, 1873, and was educated at the University of Chicago, from which he received an A.B degree in 1900. Two years before its opening in 1909, Mr. Gustafson was made superintendent of the David Ranken Jr. School of Mechanical Trades and he organized the school and supervised the construction of its first building. He was a pioneer in trade education and travelled widely and studied intensively so that the school he headed might represent the best developments in this field. He was early identified with the National Society for the Promotion of Industrial Education and served on several of its committees. Later, as president of the Vocational Education Association of the Middle West, he was a member of the committee that brought about the amalgamation of the National Society for Vocational Education and the Vocational Education Association of the Middle West to form the American Vocational Association.

He became an associate member of the A.S.M.E. in 1914.

Harris F. Hall

Major Harris F. Hall of the 390th Field Artillery, member of the Board of Assessions and president of the Berkshire County Chapter of the Reserve Officers' Association of America, died on May 13, 1927.

Major Hall was born in Fort Ransom, N. D., on October 17, 1868, and attended the Michigan Agricultural College where he obtained his degree of B.S. in 1890. Upon graduation from that institution Major Hall became an apprentice in the Altoona Shops of the Pennsylvania Railroad. After remaining there for four years he was employed by the Pressed Steel Car Company, Pittsburgh, Pa. It was for this company that he went to South Africa during

the Boer War to supervise the assembling of freight cars for the British Government. Upon his return to the United States he found employment in Chicago. From 1904 to 1917 he held managerial positions with various companies, including the Rochester Works of the General Railway Signal Company; the Montgomery Bros. & Co., Buffalo, N. Y.; and the Chalmers & Williams Co., Chicago Heights, Ill. During this time he was also an alderman in Chicago Heights and was in charge of the water department of that city.

He was captain of infantry in the Illinois National Guard from March, 1917, to January, 1918, when he became captain of headquarters company of the 33rd Division, serving until May 13, 1919. He was in three major offensives in France, Metz and Meuse-Argonne, and the Aisne-Marne, and at the last named was seriously gassed. He resigned from the Army in May, 1919, and came to Pittsfield in 1920, where he was employed by the General Electric Company as assistant superintendent. In 1922 he was appointed a captain and assigned to the 390th Field Artillery, being promoted to the rank of major in July, 1923. He was particularly active in the American Legion.

Major Hall became a member of the A.S.M.E. in 1911.

Arthur V. Hannifin

Arthur V. Hannifin, treasurer of the Hannifin Manufacturing Co., Chicago, Ill., died on July 4, 1927. Mr. Hannifin was born on January 16, 1884, in Chicago, and after completing his education he became connected with the Hannifin Manufacturing Company, where he was actively identified with the designing of compressed-air-operated devices, devoting a great deal of time to research work of that character. He had charge of the design, production and sales of that company.

He became an associate member of the A.S.M.E. in 1917.

Elmer H. Harris

Elmer H. Harris, chief engineer of the Canadian Fish and C.S. Co., died January 24, 1927, at Prince Rupert, British Columbia, Canada. Mr. Harris was well known in Los Angeles, Calif., having been superintendent of construction of the Carbondale Machine Company there, as well as sales engineer of the York California Construction Company. From 1901 to 1919 he held various positions, among them being machinist for the Llewellyn Iron Works; superintendent of engineering for the Hotel Del Coronado; chief and mechanical engineer for the Alexandria Hotel and the Hollenveck Hotel Company; construction foreman for the L. A. Ice and Cold Storage Co.; and general superintendent of the Cohaukus Manufacturing Company at Paducah, Ky. He was past-president of the American Association of Stationary Engineers and became an associate member of the A.S.M.E. in 1921. He was born at Bath, N. Y., in 1876.

Frederick F. Harrold

Frederick F. Harrold, who had been connected with the Crucible Steel Company of America since 1917, died on May 15, 1927. Mr. Harrold was born at Dereham, Norfolk, England, and received his education in English schools. He served his apprenticeship and was trained in the tool rooms of various tool companies of America; four years were spent in the drafting room of the Pressed Steel Car Company, Pittsburgh, Pa., the Standard Horse Shoe Nail Company, New Brighton, Pa., and the Ellwood City Gas Engine Company, Ellwood City, Pa.

Later he became superintendent of the Solid Steel Tool and Forge Company, Tarentum, Pa., and held this position for three and a half years. After leaving the employ of this company, he occupied the position of experimental designer for G. W. Westinghouse, Allegheny, Pa., for two years. He performed the same type of work for about two years for the Westinghouse Air Brake Company, Wilmerding, Pa. He then entered the employ of the Westinghouse Electric & Manufacturing Co., where he remained until his death.

Mr. Harrold became a member of the A.S.M.E. in 1913.

William E. Haskell

William E. Haskell, superintendent of the pipe-organ department of the Estey Organ Company, died on May 8, 1927, at his home in Brattleboro, Vt.

Mr. Haskell was born in Chicago on November 29, 1865, and left school at the age of 16 years to obtain employment in the organ works of Hilborne L. Roosevelt at Philadelphia, Pa. About three years later he was transferred to the Baltimore branch and remained there until he joined his father in the manufacture of organs. He remainded with him until 1899 when he started a factory of his own under the name of Haskell and Fischer. This company was purchased in 1901 by the Estey Organ Company of Brattleboro, Vt., who retained Mr. Haskell as superintendent until the time of his death.

Mr. Haskell became an associate of the A.S.M.E. in 1921.

George L. Hedges

George Luther Hedges was born May 23, 1885, at Lincoln, Neb., and died March 21, 1927. He was graduated from the University of Nebraska in 1907 with the degree of B.S. in electrical engineering. In 1906 and 1907 he was instructor in mechanical drawing and descriptive geometry at the University of Nebraska. During this time he designed and made complete drawings for a 12-inch equatorial telescope which was built in the University shops. In 1909 he entered the employ of the Cleveland Crane and Engineering Company, Wickliffe, Ohio, as designer, working particularly on designs of travelling cranes and on control and machinery of some special unloaders built for the Panama Canal. In 1910 he joined the Kelman Electric & Manufacturing Co., Los Angeles, Calif., in charge of engineering in connection with the making of new designs of high-voltage oil switches and kindred apparatus, and in the adaptation of standard designs to special installations. During the World War Mr. Hedges served as 1st Lieutenant in the Ordnance Department. After his discharge from the army he entered the employ of the P. A. Geier Co., Cleveland, Ohio, where he remained for five years. At the time of his death he was associated with the Hedges Lincoln Iron Works, Lincoln, Neb.

He became an associate member of the A.S.M.E. in 1919.

H. Howard Heller

Harley Howard Heller, works manager of the Ford Instrument Company, Long Island City, N. Y., died at Sound Beach, Conn., August 28, 1927. He was born at Rochester, Pa., July 18, 1875, and was graduated from Cornell University in 1903 with the degree of M.E. After graduation Mr. Heller was employed by the Henry R. Worthington Co., manufacturers of steam pumps, New York. In 1903 he joined the Wheeler Condenser and Engineering Company, Carteret, N. J., in charge of production and costs. Two years later he became superintendent of the Humphrey's Manufacturing Company, makers of sanitary equipment and pumps, at Mansfield, Ohio. The following year he became superintendent of the Hill Clutch Company, manufacturing transmission equipment at Cleveland, Ohio. Two years later he was transferred to the New York office of this company in charge of eastern sales. He joined the Ford Instrument Company in 1917.

Mr. Heller became a member of the A.S.M.E. in 1909.

Erity F. Herrick

Erity Fitch Herrick was born at Buffalo, N. Y., on February 3, 1881, and died at Youngstown, Ohio, on May 8, 1927. He served his apprenticeship with the Union Works of Buffalo. Sometime later he was graduated from Pratt Institute at New York, N. Y. He then served a three years' apprenticeship course at the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. The works of the National General Chemical Company employed him as its chief engineer and it was this position he held at the time of his death. He was associated with the Standard Steel Castings Company as master

mechanic for three years and previous to that time was connected with the Travelers Insurance Company of Cleveland and the Babcock & Wilcox Co., Barberton, Ohio.

Mr. Herrick was a member of the Electrical Maintenance Engineers of Cleveland, of the National Safety Council, and of the A.S.M.E. since 1926.

Thomas S. Homans

Thomas S. Homans at the time of his death on February 26, 1927, was chief experimental engineer of the Intertype Corporation of Brooklyn, N. Y. During the thirteen-year period that he had been connected with this company, he originated most of the novel features on the line-casting machines and took out more than 40 patents on this line of machinery.

Mr. Homans was born at Englewood, N. J., on February 26, 1871, and was educated at Phillips Exeter and Yale University. He was graduated in 1892. Upon leaving college he entered the employ of the Webster Mfg. Co., of Chicago, Ill., as a draftsman, and two years later became associated with the Oswego Machine Works, Oswego, N. Y., as a designer on paper-cutting machines. In 1897 he entered the service of the Pond Machine Tool Company of Plainfield, N. J., as a draftsman. From 1898 to 1903 he was an experimental engineer for the Unitype Company of New York. From 1904 to 1912 he was employed in the same capacity for the Mergenthaler Linotype Company and remained with them until 1912, at which time he became affiliated with the Intertype Corporation of Brooklyn. He was elected a member of the A.S.M.E. in 1921.

Alexander C. Humphreys

Dr. Alexander Crombie Humphreys, Past President of The American Society of Mechanical Engineers, Chairman of the Board of Trustees, and for twenty-five years President of Stevens Institute of Technology, and a water-gas engineer of international reputation, died at his home in Morristown, N. J., on August 14, 1927, following a general breakdown which had confined him to his bed for three weeks. His brilliant and active professional career covered a space of more than sixty years, during which his abilities in the fields of education, engineering, and administration were constantly and constructively engaged.

Dr. Humphreys was born in Edinburgh, Scotland, on March 30, 1851. At the age of eight, Dr. Humphreys was brought to this country by his parents who settled in Boston, Mass., where the boy was educated in his father's school. So excellent was this training, and so competent the student, that at the age of fourteen he passed the preliminary test examination of the United States Naval Academy; failing of admission on account of his youth, however, he entered a Boston insurance office.

Removing to New York in 1866, Dr. Humphreys entered the employ of the New York Guaranty and Indemnity Company and was shortly made receiving teller and assistant bookkeeper, thus obtaining an experience in finance and affairs which served him in his later engineering activities.

His first contact with the gas industry, in which he was destined to lay the foundation for a world-wide reputation, came in 1872 when he became secretary-treasurer, and shortly afterward superintendent, of the Bayonne and Greenville Gas Light Company. Three years of experience with the gas plant convinced Dr. Humphreys of the need of a technical education, and he made arrangements whereby he was to spend two mornings a week at Stevens Institute, studying at night and making up in the same way his absence from his usual duties. Six years was thought necessary for the completion of the course under these circumstances, but he accomplished all of the work in four and was graduated in 1881, the faculty recognizing this unusual achievement in a resolution of commendation. He was also, during his college years, vestryman, church treasurer, and Sunday school superintendent, a member of the Board of Education of Bayonne, N. J., and foreman of its volunteer fire department.

After graduation Dr. Humphreys became chief engineer of the Pintsch Lighting Company, for which he built many oil-gas plants, conducted experi-

ments on a large scale, and perfected a business organization. This same genius in engineering and organization he brought to the United Gas Improvement Company of Philadelphia in 1885 as its superintendent and chief engineer. Under a uniform system of management and control devised and developed by him, many properties of this company were operated from Philadelphia.

Dr. Humphreys' first venture in the consulting engineering profession was in 1892 when, in association with Arthur G. Glasgow, he established in London the firm of Humphreys & Glasgow, designers and constructors of water-gas plants in all parts of the world, making the first successful installation of water gas in England. In his connection with the United Gas Improvement Company, Dr. Humphreys built many gas plants in North America. He remained with this company until 1894, when he formed the New York firm of Humphreys & Glasgow. Dr. Humphreys retired from the London firm in 1908, and in 1910 reorganized the New York firm as Humphreys & Miller.

In 1902 Dr. Humphreys became president of Stevens Institute of Technology at the urging of trustees, faculty, and students, who recognized in him the qualities of sympathy, the ability of administration, and the knowledge of practical affairs necessary in the conduct of such an office. In the same year he succeeded Bayard Dod as president of the Board of Trustees of the Institute. In the fall of 1926 Dr. Humphreys announced his intention of retiring from the presidency of Stevens, but was persuaded to stay until June of the next year to round out twenty-five years of service. At the time of his death he was chairman of the Board of Trustees of the Institute.

Dr. Humphreys brought to the educational world the experience of a man of affairs and of an eminent consulting engineer who had won his technical education at the cost of personal sacrifice, and his sane views on educational matters are embodied in the presidential address which he delivered before the A.S.M.E. at its Annual Meeting in 1912.

The University of Pennsylvania recognized Dr. Humphreys' achievements by conferring on him the degree of Sc.D., and Columbia University, Princeton University, and New York University honored him with the degree of LL.D.

Dr. Humphreys was a member of many professional societies. He joined The American Society of Mechanical Engineers in 1884, served as Manager from 1907 to 1910, as Vice-President from 1910 to 1911, and was President in 1912. He was an active member of many of the Society's committees. From 1912 to 1916 he was a trustee of the United Engineering Societies. He was also past president of the American Gas Light Association, the American Gas Institute, the Engineers' Club of New York, and the American Institute of Consulting Engineers, and a trustee of the Carnegie Foundation for the Advancement of Teaching. He belonged to many other societies and clubs.

As a patron of American artists, Dr. Humphreys made a valuable collection of 150 paintings, which he sold in 1917, and through his business connections in England he was able to attract the attention of European cities and collectors to the work of American artists.

Clarence W. Huntington

Clarence William Huntington, president of the board of managers of the New Jersey State Prison, died on July 13, 1927. He was born in Newark, N. J., on May 31, 1857, and was educated in the schools of Dorchester, Mass., and Newark, N. J.

He entered the railroad service in 1876 as a freight brakeman on the Chicago, Rock Island and Pacific Railway. After serving this railroad in various capacities for 16 years, he became assistant superintendent of the Des Moines, Northern and Western Railway. This position he held until he became general superintendent of the Iowa Central Railway, two years later. From 1902 to 1914 he served as general superintendent of the Central Railroad of New Jersey and upon severing this connection he became vice-president and general manager of the Minneapolis and St. Louis Railroad. From 1917 until 1925 he held the position of president of the Virginian Railway.

He became a member of the A.S.M.E. in 1913 and was also associated with the New York Railroad Club.

Frank E. Idell

Frank E. Idell, New York representative of the Cochrane Corporation, died at his summer home at Allentown, N. J., on September 29, 1927. He was one of the prominent pioneers in the evolution of mechanical engineering in America and an account of his career would be a fairly representative history of our progress from hand-fired boilers, drawing board engineering, and hand fitting of machine parts, to 2,000,000 kilowatt super-power stations, research departments and precision mass production. He was born at Hoboken, N. J., in 1856, was graduated from Stevens Institute of Technology with the class of 1877, and received the degree of Doctor of Engineering from the same institution in 1921. Soon after his graduation he took up the profession of consulting engineer and as such planned and superintended the erection of a number of plants, among which were the steam plant of the Cooperstown Electric Light & Power Co., Cooperstown, N. Y., the Seashore Electric Railway Company, Asbury Park, N. J. (including tests), a refrigerating plant for F. A. Ferris & Co., New York, and factory, building, and power equipment for William Campbell & Co., Hackensack, N. J. He also tested the steam plants of the electric light companies at Union Hill, N. J., and at Jamestown, N. Y., to determine if the engines came up to guarantee, and made an examination of, and a report on, the condition of the electric railway at Richmond, Va., for the city council. He was engaged in a professional capacity by many concerns covering a wide variety of activities. He edited a number of books for the Van Nostrand science series. His connection with the Cochrane Corporation began in 1887 when that concern was a partnership under the name of the Harrison Safety Boiler Works and was just beginning the exploitation of the Cochrane open-feed water heater.

Mr. Idell was a member of the American Institute of Electrical Engineers, and became a member of the A.S.M.E. in 1889.

Max Jaeger

Max Jaeger was born at Karlsruhe, Baden, Germany, December 19, 1880, and died in September, 1927 He received his early education at the Realgymnasium and later attended the Polytechnikum College from which he received his degree in engineering in 1902. He served his apprenticeship with R. Hoe & Co., New York, N. Y., as mechanical draftsman, and the following year went to E. W. Bliss Co., Brooklyn, N. Y., and later to Max Ams Mach. Co., Bridgeport, Conn. In February, 1905, he went to Germany as assistant to the chief engineer for L. Schuler, Groppinger. He returned to E. W. Bliss Co. in 1906 as mechanical engineer and in 1907 went to the Max Ams Mach. Company, Bridgeport, as mechanical engineer in charge of the drafting room. He remained here until 1912 when he established the Jaeger Rotary Valve Motor Company, New York, N. Y., devoted to developing his own inventions.

In 1917 Mr. Jaeger accepted a position as designing engineer with Simon Cooper, efficiency engineer, New York, N. Y. In November of that year he joined the American Machine & Foundry Co., Brooklyn, N. Y., as mechanical engineer and in May, 1918, he became chief engineer for the Vacuum Pulp Products Corporation, New York, N. Y., developing their process and designing their three automatic machines. In 1919 he entered the service of the Anchor Cap & Closure Corporation, Long Island City, N. Y., and the Capstan Glass Company, Connellsville, Pa., as chief design engineer. He remained here until 1924 when he gave up this work to devote his entire time to the development of his own inventions.

In 1925 Mr. Jaeger again became associated with the E. W. Bliss Co., Brooklyn, N. Y., on the development of automatic machinery. Later in the same year he joined the American Radiator Company, working in their research department on the designing of special automatic machinery. He held this position at the time of his death. He contributed papers at various times to the technical press, particularly to *Machinery* and the *American Machinist*. He joined the A.S.M.E. in 1921.

Fleming E. Jamieson, Jr.

Fleming E. Jamieson, Jr., who became a junior member of the A.S.M.E. in 1924, died on February 25, 1927. He was born in Pittsburgh, Pa., in October, 1900, and received his education at the Allegheny High School and Cornell University, being a graduate of the class of 1923. His shop experience started with the Jones & Laughlin Steel Corpn. after leaving college. Later he was transferred to the blooming-mill department where he held many positions. He was transferred in March, 1926, to the 14-in. rolling mill as assistant superintendent, which position he held at the time of his death.

Arthur R. Jealous

Arthur R. Jealous was born at Fall River, Mass., on June 19, 1885, and died January 15, 1927, in Newark, N. J. He was a graduate of the class of 1907 of the Massachusetts Institute of Technology. At the time of his death he was assistant works manager of the Clark Thread Company, of Newark, N. J. From 1899 to 1907 Mr. Jealous was connected with the E. W. Pitman Co., American Woolen Company, and the Vassalboro Mills. In 1907 he was employed by the American Woolen Company at Lawrence, Mass., as draftsman and later was promoted to the position of assistant to the electrical engineer. In December, 1912, he became associated with the General Electric Company, at Boston, Mass., as sales engineer in the mill power department.

Besides being a junior member of the A.S.M.E. since 1908, Mr. Jealous was also a member of the A.I.E.E.

Charles L. Johnson

Charles L. Johnson was born in Chicago, January 26, 1873, and died at Pittsfield, Pa., August 24, 1927. He was educated in the Chicago public schools and at Cornell University, from which he was graduated in 1897 with the degree of M.E. In 1899 he entered the employ of the Western Electric Company, where he spent two years in shop accounting work, reorganization, and general manufacturing clerical work, and fifteen years in the development of methods for distribution of overhead expense burden among the departments, machines, and ultimately shop jobs. Later he took over the reorganization of a factory of 1200 employees, and the organization of shop accounting methods and personnel in three other shops of about the same size in Antwerp, London, and Berlin. In 1914 he was placed in charge of clerical, financial, and accounting work throughout the manufacturing organization at Hawthorne, and in 1923 was transferred to New York as general clerical superintendent. In 1926, he was made office procedure engineer at New York.

He became a member of the A.S.M.E. in 1915.

Charles G. Juneau

Charles George Juneau was born in Milwaukee, Wis., Dec. 12, 1875. He attended the public schools of Milwaukee and spent two years at the Milwaukee Engineering College. From 1906 to 1917 he was in charge of the Forge Department for the Chicago, Milwaukee & St. Paul Railroad, having under his jurisdiction all forgings for cars and locomotive tanks, both new work and repair work. He also had general supervision over structural parts for cars, both regular and special, and passenger equipment. For the next three years he had general supervision of the freight department, including machine and forge shops. In 1920 he was appointed master car builder of the Milwaukee System. His death occurred on May 26, 1927.

Mr. Juneau became a member of the A.S.M.E. in 1921. He was also a member of the American Society for Testing Materials.

J. O. Kaiser

Julius O. Kaiser, who since 1916 had been a familiar figure around the Engineering Societies Building in New York City, died at the Dover (N. J.) General Hospital on February 4, 1927. Mr. Kaiser's death resulted from injuries received three days previously when he was struck by a speeding automobile as he was walking in the evening on the road near the Technical Club in Kenvil, N. J.

Julius Otto Kaiser was born in Stuttgart, Germany, on March 10, 1868, and received his education in the Pfander, Burger and Continuation Schools at Stuttgart and under private tuition in Brisbane, Australia. He had apparently migrated to Australia at a comparatively early age, and it was in Brisbane that he began his professional career. He was a teacher of languages and music there from 1887 to 1891.

Following a year as second master at the Downs Grammar School, Toowoomba, Australia, Mr. Kaiser went to Vina del Mar, Chile, where from 1892 to 1893 he was senior master of the Instituto Ingles, and from 1893 to 1896 he was principal of Colegio Miramar.

Mr. Kaiser came to the United States in 1896 and from 1896 to 1899 was librarian and chief of the Bureau of Translations at the Philadelphia Commercial Museum. At the end of that period he went to London where for three years he was librarian of the Commercial Intelligence Bureau, Ltd. Following a year in the library service of the British Westinghouse Company, he was from 1904 to 1911 librarian of the Tariff Commission in London. By this time he was a recognized authority upon indexing, and as a result was called upon to reorganize the management of correspondence in the head office of Vickers, Ltd., in London, and to reorganize the library service and drafting-room files at the Ardeer Factory of the Nobel's Explosives Company, Stevenston, Scotland.

Mr. Kaiser came to New York in 1916 and after a year on translation and research work in the Engineering Societies Library he became an associate editor for the A.S.M.E. He also served as chief bibliographer of the Engineering Societies Library and as reviewer of foreign journals for the A.S.M.E.

Mr. Kaiser's reputation as an expert on indexing eventually reached the executives of the Hercules Powder Company through their contacts with the Nobel plant in Scotland. The result was that on the first of the year Mr. Kaiser left the A.S.M.E. on a leave of absence to systematize the library of Hercules plant in Kenvil, N. J. His work was just getting under way when the accident occurred.

Mr. Kaiser became an associate of the A.S.M.E. in 1925.

Alonzo G. Kinyon

Alonzo G. Kinyon, consulting engineer with the Fuller Lehigh Company, Fullerton, Pa., died November 13, 1927, following an operation at Johns Hopkins Hospital, Baltimore, Md. Mr. Kinyon was born at Amboy, Ill., July 12, 1867. At the age of 17 he started work on the Fond du Lac, Amboy & Peoria R. R. as newsboy and advanced step by step through every branch of railway transportation. During the time he was connected with the railways he was identified with development in the fuel-burning equipment and fuel conservation with different railway companies. He also served as instructor in railway equipment and operation with the International Correspondence School. In 1915 he became interested in pulverized fuel, joining a company connected with the use of pulverized coal on locomotives. Later he organized the Kinyon Pulverized Fuel Engineering Company to work out pulverized fuel application for hotel and apartment use, and in September, 1918, he became associated with the Fuller Lehigh Company.

While his service to the various industries was marked by the contribution of valuable inventions in a wide variety of subjects, the outstanding point in Mr. Kinyon's career was the invention and development of the Fuller-Kinyon conveying system for transporting pulverized material. This system is now widely used in many diversified industries. In recognition of the invention and development of this system, he was, on November 11, 1926, awarded the

Longstreth medal of honor by the Franklin Institute, Philadelphia, as well as life membership therein.

Besides his affiliation with the Franklin Institute, he was a member of the Traveling Engineers and the International Railway Fuel Association. He became a member of the A.S.M.E. in 1921.

Richard W. Lacy

Richard William Lacy was born at Los Angeles, Cal., October 18, 1895. He died August 1, 1927. His early education was received at Harvard Military School and the public schools. After graduating from high school he attended Throop School, which subsequently became the California Institute of Technology, and then entered Occidental College. His first position was with the Southwestern Portland Cement Company as assistant engineer, where he remained until the new plant they were erecting was completed. He then became associated with the Lacy Manufacturing Company of Los Angeles. In 1923 he represented the A.S.M.E. at the International meeting held at Liège, Belgium, where he was the guest of the British Institute of Mechanical Engineers. In 1924 and 1925 he served as assistant general manager of the Santa Monica Bay Telephone Company. In 1926 he returned to the Lacy Manufacturing Company with which he was associated at the time of his death.

He became a junior member of the A.S.M.E. in 1917 and an associate member in 1926.

Norman Spear Lawrence

Norman Spear Lawrence, vice-president and director of sales of the Whiting Corporation, died October 26, 1927, after a brief illness. He was born May 9, 1882, at Chicago, Ill., and received his early education in the schools of Chicago. He was graduated from Cornell University in 1904 as mechanical engineer and shortly after entered the employ of the Whiting Corporation, Harvey, Ill., as estimator, becoming successively chief estimator, assistant sales manager, vice-president, and director of sales. During the past few years, he was also president of the Swenson Evaporator Company, a subsidiary of the Whiting Corporation.

Mr. Lawrence was a member of the American Foundrymen's Association, Foundry Equipment Manufacturers' Association, and Electric Overhead Crane Institute. He became a member of the A.S.M.E. in 1915.

Moses D. Levitch

Moses D. Levitch was born at New York, N. Y., October 28, 1901, and died September 15, 1927. He was educated at the Asheville high school and at Rensselaer Polytechnic Institute from which he was graduated with the degree of M.E. in 1924. After his graduation he was employed as draftsman by the Asheville Supply & Foundry Co., Asheville, N. C. For two and a half years before his death he was production manager in the structural steel department of S. Sternberg & Co., Asheville, N. C. He became a junior member of the A.S.M.E. in 1925.

Josef Limbrunner

Josef Limbrunner was born in April, 1887, at Bavaria, Germany, and died March 25, 1927. He was educated in the public schools of Germany and later specialized in the designing of automotive machinery. In 1912 he was employed by the Green Fuel Economizer Company, Beacon, N. Y., as draftsman and inspector of heating and ventilating work. He remained with them until July, 1914, when he became associated with Sidney Blumenthal & Company, Shelton, Conn., as designer of textile machinery. In July, 1915, he was promoted to the position of chief draftsman and associate mechanical super-

intendent, and in May, 1917, he advanced to the position of mechanical superintendent and equipment engineer, in charge of machine and equipment repair and the building and designing of textile machinery. He severed this connection in September, 1918, to accept a position as chief engineer and mechanical supervisor of automatic machinery, with the N. J. Mach. Corp., Hoboken, N. J., and the following year was promoted to general manager. Later he became associated with J. M. Huber, Inc., Brooklyn, as plant engineer, the position he held at the time of his death. He was a frequent contributor to the technical press.

He became an associate member of the A.S.M.E. in 1919.

Arthur C. Liscom

Arthur Clark Liscom died at Detroit, Mich., September 22, 1927. He was born at Port Huron, Mich., December 26, 1873, and was educated at the United States Naval Academy. From 1900 to 1902 he was employed in the department of layouts and maintenance, Detroit Exchange of the New State Telephone Company, and from 1902 to 1903, did similar work for the Union Telephone Company, Alma, Mich. From 1903 to 1910 he was in business for himself at Port Huron, and in 1910 became associated with the Fairbanks, Morse Company. From 1912 to 1914 he was superintendent of construction with the Public Lighting Commission of Detroit, and in 1914 entered the employ of the Ford Motor Company, to start experimental work on the producer gas plant. Largely as a result of his experiments and under his supervision this plant, the largest producer gas plant in the United States, was built. From 1914 until his death he served as superintendent of this plant.

Mr. Liscom became a member of the A.S.M.E. in 1919.

Robert McA. Lloyd

Robert McAllister Lloyd was born in June, 1864, at Elizabeth, N. J., and died in New York, N. Y., December 14, 1927. He received his technical education at Lehigh University from which he received a special certificate in electricity in 1886. In 1899 he was appointed chief engineer for the Daft Electrical Company where he remained until 1891 when he became consulting engineer for the Accumulator Company and the Electro-Dynamic Company. In 1892 he started the Plante Company and served as its president until he sold it to the Electric Storage Battery Company, Philadelphia, in 1895. He continued as consulting engineer for the Electric Storage Battery Company until 1899. In 1899 he became president of the Electric Vehicle Company and of the Siemens & Halske Company of America. He was also president of the Appert Glass Company, which he consolidated with the Mississippi Glass Company. During this time he was president of the Electric Boat Company and one of its engineers. In 1906 he organized the General Vehicle Company and became vice-president and engineer until 1912 when he sold his interest in the concern and resigned. In 1912 he established his own business as consulting engineer, principally in connection with machinery problems and the development of new industries. For some years he was president and director of Mantle & Company, machinists and engineers.

He was a member of the American Institute of Electrical Engineers, the American Institute of Mining & Metallurgical Engineers, American Society of Refrigerating Engineers, the Institute of Electrical Engineers of Great Britain, the Society of Automotive Engineers, and the Electrochemical Society. He became a member of the A.S.M.E. in 1918.

George Alben E. Lundell

George Alben E. Lundell was born at Chicago, Ill., August 7, 1886. He died November 1, 1927. He was educated in the Chicago public schools and graduated from the Robert A. Waller High School. He studied patent law at New York University. From 1904 to 1919 he was connected with the Western Electric Company, first as draftsman and later as electrical engineer, specializing in the design of switchboards of all types. In 1920 he began the

practice of patent law in New York, N. Y., and maintained his own office there until his death. Over two hundred patents for inventions were issued to him, many of them in wide use, and some of them patented in foreign countries.

He was a charter member of the New York Patent Law Association, secretary of the Radio Engineering Company, and a member of the A.S.M.E. since 1919.

Edwin M. Mackie

Edward M. Mackie was born at Aberdeenshire, Scotland, May 5, 1861. He was educated in the grammar school there and received his technical education at the Science and Arts Department, South Kensington, the City and Guilds, London, and at Gordon's College, Aberdeen. He served his apprenticeship in the machine shops of C. Davidson & Son, Aberdeen, and gained further experience as machinist at the Ferryhill Foundry and Machine Company, Aberdeen. In 1887 he came to New York and in 1888 he joined the Rand Drill Company, Tarrytown, N. Y., as plant and field engineer, and later became interested in the design and development of air compressors and rock-drilling machinery. During this period he was closely identified with progress on the Chicago Canal, and represented his company at the Pan-American Exposition, the Chicago World Fair, and the Paris Exposition. During 1904 he became connected with the Chicago Pneumatic Tool Company at their Cleveland plant, where he was interested in the design of rock-drilling and air-compressing machinery. In 1906 he was transferred to the Franklin plant as chief designer and later was made manager of this plant. During 1913 he became manager of the Pneumelectric Company, Syracuse, N. Y., and continued this position until his death, August 10, 1927.

He was a member of the Technology Club of Syracuse and became a member of the A.S.M.E. in 1915.

Harry A. Madison

Harry Arnold Madison was born at Cambridge, Ohio, March 19, 1894, and died December 26, 1927, at the Battle Creek Sanitarium, Battle Creek, Mich., from complications due to influenza. Mr. Madison was educated at the Pittsburgh high school and at the Carnegie Institute of Technology from which he received his B.S. degree in 1917. During vacations and part time while he was at college he was employed in the drafting room of the Westinghouse Air Brake Company and also of the Mesta Machine Company, both of Pittsburgh. In 1917 he entered the United States Naval service as naval air pilot. After his discharge in 1919 he entered the employ of the Westinghouse Electric & Manufacturing Co. in the turbine engineering department on testing and miscellaneous work with medium and large steam turbines.

In 1920 Mr. Madison became associated with John A. Stevens, consulting engineer, as assistant engineer in the Cleveland, Ohio, office, where he was employed on plant analysis and power investigations of industrial plants and on power plant design. In 1922 he was made assistant to the district steam engineer of the Cleveland district of the American Steel & Wire Co., where he assisted in tests, the maintenance of gas and steam power equipment and mill machinery, power reports and analysis, and made investigations of power requirements of various manufacturing processes and of the distribution of steam, water and electric power. In 1925 he became assistant special engineer for the Carnegie Steel Company as mechanical engineer at the Homestead works at Munhall, Pa. He severed his connection with them to join the Pennsylvania-Ohio Power & Light Co., at Youngstown, Ohio, as assistant superintendent of power, the position he held for two and one-half years prior to his death.

He became a junior member of the A.S.M.E. in 1919 and was promoted to associate member in 1925.

Charles M. Manly

Charles M. Manly, one of the pioneers in the development of the airplane, died October 16, 1927. He was born at Staunton, Va., April 24, 1876, and was educated at Furman University where he received the degree of Master

of Mathematics and Mechanical Philosophy. He received the degree of M.E. from Cornell University in 1898. Upon graduation he joined the staff of Dr. Samuel P. Langley, Smithsonian Institute, as chief assistant in aviation development work. Mr. Manly invented, designed, and built the first gasoline engine used for aviation and used in the historic Langley aeroplane. He made the test flights in the ill-fated plane, on which work had to be stopped because of lack of funds.

In 1905 Mr. Manly became vice-president and chief engineer of the Manly Drive Company, New York, N. Y. During the World War he was consulting engineer of the aviation section of the British War Office, and from 1915 to 1920 he was consultant and chief inspection engineer of the Curtiss Aeroplane and Motor Corporation, which he served in 1919 and 1920 as general manager. At the time of his death he was a member of the firm of Manly & Veal, construction engineers, New York, N. Y.

In 1918 Mr. Manly served as a member of the United States Commission to the International Aircraft Standards Conference in London. He also served as a member of the automotive advisory committee to the United States Ordnance Board. Mr. Manly became a member of the A.S.M.E. in 1916. He was also a member of the Society of Automotive Engineers and was its president in 1919. He was an authority on automotive transportation, power transmission, and generation and was a frequent contributor to technical and scientific publications. With Dr. Langley, he was author of the Langley Memoirs on Mechanical Flight in the Smithsonian Contribution to Knowledge.

Frank A. Mazzur

Frank A. Mazzur, of F. A. Mazzur & Co., Boston, Mass., died in that city on February 4, 1927. He was born on February 5, 1871, at Jersey City, N. J. After completing his education at Jersey City and New York, in the spring of 1894 he entered the employ of the Wheeler Condenser and Engineering Company, holding positions in the foundry, machine shop, drafting room, and engineering department. In 1897 he was sent abroad to superintend the installations being erected in Brighton and other parts of England. He returned to the United States two years later to become a part of the sales force of the New York office. From 1899 to 1904 he was employed by the Newburgh Ice Machine and Engine Company and the Wright Steam Engine Works, both of Newburgh, N. Y. In 1907 he went to New England and started business under the name of F. A. Mazzur & Co., with offices in Boston. Here he represented the Wheeler Condenser and Engineering Company and later the Peabody Engineering Corporation, New York, N. Y.

Mr. Mazzur was a member of the Engineers' Club of Boston and became a member of the A.S.M.E. in 1910.

James H. McEwen

James Henry McEwen, retired manufacturer and oil producer and a member of the A.S.M.E. since 1882, died suddenly in New York, N. Y., on July 14, 1927. Mr. McEwen was born at Angelica, N. Y., on July 6, 1854. Shortly afterward his family moved to Wellsville, N. Y., where he received his early education, prematurely interrupted by his running away to the Pennsylvania oil fields at the age of thirteen. He first worked on a lease near Pithole, later becoming foreman of a telegraph construction gang. Then, becoming interested in mechanics, he returned to the family shops, McEwen Bros. in Wellsville, to serve his apprenticeship as a machinist. Upon completing his apprenticeship he entered Ohio State University at Columbus and was graduated with honors in 1880. He then became shop foreman for McEwen Bros. and in 1885 he organized the J. H. McEwen Manufacturing Co. of Ridgway, Pa., now owned by the Elliott Company of Pittsburgh. In 1900, upon the death of an older brother, he assumed the presidency of McEwen Bros. of Wellsville and retained the position until 1919 when the demands of McEwen Manufacturing Company of Tulsa, Okla., which was organized in 1912, became so great as to claim all his attention.

In 1901 he organized the Wellsville Refining Company and constructed a complete refinery at Wellsville, N. Y. This enterprise was absorbed by the

Union Petroleum Company and is now owned by the Sinclair Refining Company. Recently he designed the "Einhorn Intestinal Pump Capsule" which is a device so small that it can be swallowed and will automatically take a sample of the contents of the intestinal tract.

Herbert Meisterknecht

Herbert Meisterknecht was born at Hamburg, Germany, April 11, 1883, and died November 14, 1927. He was educated in an engineering school at Hamburg and afterwards traveled in Cuba installing machinery in sugar plantations and iron mines. In 1905 he joined the Havana Central Electric Railroad Company as assistant in charge of the construction and operation of the power house. In 1908 he came to New York, N. Y., as draftsman for the New York Taxi Cab Company. He was later promoted to the position of assistant repairing engineer. In 1910 he became maintenance engineer at the 59th Street power house of the Interurban Transit Company. In 1912 he joined the De la Vergne Machine Company as service engineer, spending three years as sales engineer and representative in Mexico. In 1914 he became associated with the Standard Oil Company of New Jersey in charge of the construction and operation of a power house at Tampico, Mexico. In 1916 he returned to the De la Vergne Machine Company as representative in South America. In 1918 still with the De la Vergne Machine Company, he was placed in charge of the assembly, erection, and test of steam turbines for the United States Navy.

He became an associate member of the A.S.M.E. in 1919.

Jaroslav A. Michal

Jaroslav A. Michal, consulting engineer, died on August 22, 1927, at Žamberk, Czechoslovakia, while visiting his relatives in his native country. Mr. Michal was born April 3, 1871, at Mladá Boleslav and attended public schools there and the high school at Prague. After two years of machine apprenticeship he entered the technical college of Mittweida, Germany, and was graduated as mechanical engineer in 1897. During the next year he worked as mechanical engineer for Mechcler & Bros., Cologne, Germany, and in the following year held a similar position with the Ceskomoravska a.s., machine works in Prague. From 1899 to 1907 he was owner and operator of a factory making equipment for central heating plants. In 1907 he came to the United States in order to exploit his patents relative to the abatement of smoke and the improvement of combustion in steam locomotives, and for this purpose associated with the American Steam Users Economy Company. From 1909 to 1924 he was mechanical engineer with the General Chemical Company, and from 1924 to the time of his death he was active as consulting engineer for the chemical industry in New York City. He became an associate member of the A.S.M.E. in 1921.

John R. Mitchell

John Robert Mitchell, sales engineer for W. H. Miner, Inc., who died November 7, 1927, in Chicago, was born in 1873 at Lafayette, Ind. He attended Purdue University and in 1891 entered the employ of the Chicago & Northwestern Railway as a special apprentice. He was transferred to the testing department where he worked for about a year and was then put in charge of the dynamometer car. From 1899 to 1902 he was a roundhouse foreman on the Galena division and general foreman at Ashland, Wis., and Green Bay. In 1902 he was appointed master mechanic on the Atchison, Topeka & Santa Fé Railway at Cleburne, Texas, and later returned to the Chicago & Northwestern Railway where he served as testing engineer, located at Pittsburgh, Pa. Mr. Mitchell became associated with W. H. Miner, Inc., as mechanical engineer in May, 1902, and in 1906 was appointed sales engineer.

He was elected associate member of the A.S.M.E. in 1915.

William F. Moody

William Ford Moody was born May 20, 1877, at Lebanon, Me., and died at Denver, Colo., November 11, 1927. He received his early education at a New England Academy and later under private tutors. From 1901 to 1906 he was employed in the engineering office of Nock & Garside Elevator Works, Denver. He then established his own office as designing engineer. He designed mining, milling, and sugar machinery for the Stearns-Roger Manufacturing Company; designed the cement plant of the United States Portland Cement Company now operated by them at Florence, Colo.; and designed a complete line of freight and passenger elevators for Nock & Garside Elevator Works.

He became a member of the A.S.M.E. in 1913.

Joseph Bennett Mossman

Joseph Bennett Mossman was born at Leetonia, Ohio, October 28, 1874, and died in California, November 10, 1927. He was educated in the public schools of Ohio, and had a varied experience in engineering. From 1906 to 1911 he was sales engineer for the Allis-Chalmers Company, at Milwaukee, Wis. In 1911 he became branch manager for the Ingersoll-Rand Company, New York, N. Y. His particular work was the application and the recommendation as to design and performance of mining, steam, electrical, and hydraulic machinery. Later he was made district sales manager for the Victaulic Company of America, San Francisco, Calif., the position he held at the time of his death.

He became a member of the A.S.M.E. in 1921.

Raymond F. Nailler

Raymond F. Nailler was born in Akron, Ohio, in 1876. He was educated in the public schools of Akron and at Buchtel College. After a general experience in the electrical construction business in Akron, which included the installation of power houses, designing factories, and handling steam and electrical plants, he became chief engineer and superintendent of construction of the Oregon Securities Company, Orseco, Ore., in active charge of the work. Later he was chief engineer for the Artillery District of Columbia, in charge of electrical, mechanical, and steam equipment fortification work, planning submarine mines, installation of range finders, and other work pertaining to coast defense. He was chief engineer of the Old Dominion Copper Mining and Smelting Company, Globe, Ariz., in charge of construction and installation of new mining equipment. He designed, built, and operated the Glascate Company, Cleveland, Ohio, and built and operated the Enamelled Pipe & Engineering Co., Elyria, Ohio, designing factories, special machinery, furnaces, equipment, and process of manufacture. At the time of his death, July 25, 1927, he was president and general manager of this company.

He became a member of the A.S.M.E. in 1911.

Marvin A. Neeland

Marvin A. Neeland was born at Grand Rapids, Mich., in 1870. When he was 15 years old he began his career as an apprentice at the bench in a sheet-metal shop in Grand Rapids and supplemented his work by study at home at night. In 1892 he left Grand Rapids and after a brief stay at St. Paul, Minn., he went to Pittsburgh, Pa., where he found work at the Duquesne works of the Carnegie mills. He was promoted rapidly, and at the age of 25 was chief engineer of the Duquesne plant where he constructed two blast furnaces of his own design which are still in use. He also incorporated improved methods of ore handling, known as the "Neeland hoist." The designs of his furnaces were far in advance of the type then generally used, and they proved of such value that today they are commonly used in all large steel plants throughout the country. After leaving the Duquesne plant he was chief engineer of the Ohio Steel Works, and designed their plant at Youngstown, Ohio. He then became chief engineer for the National Steel Company and had charge of

design and construction in all their steel and iron properties, including those at Youngstown, Shenango Valley, Newcastle, Belair, and Mingo Junction.

About 1902 Mr. Neeland became associated with the United States Steel Corporation and for about ten years he was assistant vice-president and chief consulting engineer for that company. He was secretary of the committee which had charge of the Gary works, at Gary, Ind., and also of the plant of the Minnesota Steel Company, at Duluth, Minn. He had charge of all construction work for the entire corporation and its subsidiaries. One of his achievements was the overseeing of the construction of the Gary plant, which is the largest individual plant of the United States Steel Corporation. In 1915 he constructed the zinc plant at Denora, Pa., for the Steel Corporation. This plant was built in record time to meet an urgent demand from all over the world for an increased output of zinc, and when completed and in operation it not only increased the zinc production capacity of the United States, but also effected a large saving over the then current cost of production.

Shortly after the completion of this plant, Mr. Neeland resigned his position with the United States Steel Corporation to go to Russia as representative of the American International Corporation, the Midvale Steel Company, and the National City Bank, of New York, N. Y. He stayed in Russia for a year, making a thorough study of that country's iron, manganese, and coal properties, and of the steel plants there. His work was most creditable in every particular, but with the Russian revolution and the continuance of the World War, it was found impossible to take any advantage of it.

After his return from Russia, he was made president of the New York Shipbuilding Corporation, Camden, N. J. This was the largest shipbuilding plant in this country, and second in size only to Harlan & Wolfe, of England, which is the largest in the world. During the World War the New York Shipbuilding Corporation employed about thirty thousand men, and was the plant which initiated the intensive competitive shipbuilding program in this country at that time. All classes of ships, including destroyers, submarine-chasers, and passenger liners, were built at this plant. Mr. Neeland remained as president until the plant was sold in 1925 to the American-Brown-Boveri Corporation, when he retired from active business and located at Beverly Hills, Cal. He died there on October 23, 1927.

Mr. Neeland was a member of the Engineers' Society of Western Pennsylvania and had been a member of the A.S.M.E. since 1915.

L. Edward Osborne

L. Edward Osborne, M.E., of the Locomotive Stoker Company of Pittsburgh, Pa., was born on January 2, 1882, at Independence, Va., and was graduated from George Peabody College, Nashville, Tenn., and from the Virginia Polytechnic Institute with the degree of M.E. His shop experience was received in the Platt Iron Works in Dayton, Ohio. He became associated with the Locomotive Stoker Company in 1909 and was active from that time until his death on January 30, 1927, in the development of mechanical stokers for firing locomotives. He was appointed mechanical engineer of this company in 1916.

Mr. Osborne was a member of the Pittsburgh Chamber of Commerce and the Pittsburgh Railway Club, and became a member of the A.S.M.E. in 1912.

George A. Palmgren

George A. Palmgren was born at Halsingfors, Finland, in 1887, and died on July 30, 1927. He received his secondary education at the Swedish Real Lyceum, Helsingfors, Finland, and was graduated from the Technical University of Helsingfors, Finland, with the degree of M.E., in 1911. He received practical experience as machinist in various machine shops in Finland for two years, and then became draftsman and designer for the American Sugar Refining Company, Brooklyn, N. Y., from 1911 to 1916, the last two years as chief assistant. In February, 1916, he was appointed designing engineer with

the General Chemical Company, New York, in charge of building chemical plants complete with equipment. In August, 1920, he became chief building engineer with Aktiebolaget W. Gutzeit & Co., Helsingfors, Finland, constructing saw mills, soda pulp mills, and by-product factories, complete with equipment. In August, 1922, he entered partnership with Joseph Christenson of Orange, N. J., in the general contracting business, building factories, bank buildings, and private residences. In August, 1923, he was made designing engineer with the General Chemical Company, New York.

Mr. Palmgren was a member of the Teknolog Foreningen, Helsingfors, Finland, and became a member of the A.S.M.E. in 1924.

Mark Pearson

Mark Pearson, at the time of his death on April 14, 1927, was textile engineer of B. F. Perkins & Son, Inc., Holyoke, Mass.

Mr. Pearson was born at Bradford, Yorkshire, England, in March, 1874, and received his education at the Bradford Technical College, being graduated in 1889. Upon obtaining his education he was apprenticed to Shaw & Co., Ltd., and worked in the machine shop. Later he attained the position of assistant mechanical engineer and from 1900 to 1908 served them as mechanical engineer. In 1908 Mr. Pearson accepted the position of mechanical engineer with the firm of Thornton, Hannan & Marshall, dyers and finishers. From 1912 to 1917 Mr. Pearson was connected with the Bradford Dyeing Association, Bradford, R. I., as mechanical engineer. He held this position until 1927 when he entered the employ of the B. F. Perkins & Son, Inc., in a consulting and sales capacity.

Mr. Pearson became a member of the A.S.M.E. in 1917.

Ernest B. Perry

Ernest B. Perry, president of the Industrial Works, Bay City, Mich., died at his home on August 7, 1927. He was born at Prairie du Chien, Wis., on December 9, 1868, and received his early education in the public schools of Ann Arbor, Mich. He was graduated from the University of Michigan in 1889 and received his master's degree in mechanical engineering in 1896. In 1889 he became associated with the Industrial Works as draftsman and continued with that firm until the time of his death. In 1891 he was made superintendent and mechanical engineer, and later vice-president and general manager. In 1924 he became president and held this position until his death.

Mr. Perry was director in the First National and Bay County Savings banks. In 1907 he became associated with the A.S.M.E. He was a director of the Research Department of the University of Michigan, as well as a trustee of the University Alumni Fund.

Frank B. Philbrick

Frank B. Philbrick, member of the A.S.M.E. since 1891, died at his home at Waterville, Me., January 31, 1927. He was born at Waterville in 1848 and received his education in the local schools and in New York City. His early work was done in the Baldwin Locomotive Works of Philadelphia, Pa., and the Maine Central Railroad Shops at Waterville. He formed a partnership with Frank B. Webber and Charles T. Haviland in 1873 in a foundry and machine shop. The business was later incorporated as the Waterville Iron Works, Mr. Philbrick serving as president and engineer. At the time of his death he was actively engaged in the work of this company.

Charles Hill Phillips

Charles Hill Phillips was born January 23, 1879, at Schomburgh, Ontario, Canada. He died in Buffalo, N Y., October 10, 1927, after an illness of nine months. He received his early education in the local schools of Aurora, Canada, and after a few years of practical experience in various machine

shops of Toronto, Canada, he entered Toronto University in 1907. In 1911 he received the degree of Bachelor of Applied Science. Following his graduation he was employed by the Howard Iron Works, Buffalo, N. Y., as chief engineer. When the Curtiss Airplane Company was organized at Buffalo, he became connected with them in the capacity of superintendent of tools and equipment. In 1917 he went to Wheeling, W. Va., as general manager of the West Virginia Company. He remained there until the close of the war when he went to Buffalo as mechanical engineer for the American Body Company. He later became associated with the Strong-Scott Manufacturing Company of Minneapolis, Minn., and the Ruggles-Klingmann Manufacturing Company of Boston, Mass., as their local representative for Western New York, with offices at Buffalo.

He became a member of the A.S.M.E. in 1914. He was also a member of the Engineering Society of Buffalo.

Charles T. Plunkett

Charles T. Plunkett, who for the past ten years has been president of the Berkshire Cotton Manufacturing Company, died at Adams, Mass., July 8, 1927.

Mr. Plunkett was born on February 20, 1855, at Adams, Mass., where he has lived during his life. He was educated in the public schools there, and shortly after graduation from the high school he became identified with the cotton textile industries which his father had established in Adams.

In addition to being president of the Berkshire Cotton Manufacturing Company, at the time of his death he also held the offices of president and treasurer of the Greylock Mills, president and treasurer of the W. C. Plunkett & Sons Mills, and treasurer of the Shellmound Plantations and the Taconic Companies of Schlater, Miss., which supply much of the cotton for the industries with which he was connected.

He had also served as president of the National Association of Cotton Manufacturers, president of the Industrial Mutual Insurance Company of Boston, vice-president of the Cotton-Woolen Mutual Fire Insurance Company and of the Rubber Mutual Fire Insurance Company, and director of the Berkshire Mutual Insurance Company of Pittsfield, and the Liberty Mutual Insurance Company of Boston. He was recently re-elected vice-president of the Home Market Club.

Mr. Plunkett was deeply interested in educational matters and was president of the board of trustees of the Deerfield Academy and chairman of the school committee of Adams.

He was greatly interested in the community in which he lived, giving freely of his time to public office and of his funds to public improvements. At the time of his death he was president of the Greylock National Bank of Adams.

Although primarily a manufacturer, he took great interest in the mechanical and engineering features of the business.

Mr. Plunkett had been a member of the A.S.M.E. since 1909, and served as a vice-president from 1916 to 1918.

Jonas L. T. Popp

Jonas L. T. Popp, chief engineer of the Dobbie Foundry & Machine Co., Niagara Falls, N. Y., died on June 20, 1927. He was born at Elsinore, Denmark, on February 23, 1880. He was apprenticed for five years in a machine shop in his native city, and later took a course in the Mittweida Technichum, Mittweida, Saxony, Germany. On coming to the United States, he was associated with the Lidgerwood Manufacturing Company, Brooklyn, N. Y.; the Robins Conveying Surveying Company, of New York; and the Western Electric Company, New York, N. Y. He spent 1912 in Buenos Aires, as engineer on the erection of a railroad shop. He was in Iceland representing a Danish firm at the time of the gold find, 1908 and 1909.

At the time of his death, Mr. Popp had been chief engineer of the Dobbie Company for 15 years. Mr. Popp became a member of the A.S.M.E. in 1919.

James Powers

James Powers was born February 12, 1870, at Odessa, Russia. He was graduated from the Polytechnic School in Russia at the age of 14. He served his apprenticeship in the shops of the Russian Imperial University and in a machine shop at Antwerp, Belgium. His first position in the United States was with the Garvin Machine Company with whom he remained about one year. He went to Pursell & Weed as foreman for seventeen months, and was then appointed superintendent of the Louis Manufacturing Company for two years.

About 1906 Mr. Powers was appointed by President Roosevelt as an expert with the Bureau of Census. At this time and subsequently he invented, designed, developed, and supervised the building of an entirely new group of machines for making and taking statistical card records. This equipment was used by the Bureau of Census for collating and establishing the population census of the United States for 1910 and 1920. In 1911 Mr. Powers further developed tabulating and statistical card-accounting machinery and supervised the building of it. The machines were taken over and commercialized by the Powers Accounting Machine Corporation. This concern recently was absorbed as a branch of the Remington-Rand Corporation of New York. Mr. Powers was also the inventor and patentee of a large number of collateral devices in the engineering field, and at the time of his death on November 8, 1927, was engaged in the development of further improvements in statistical and card-accounting machinery.

Mr. Powers became a member of the A.S.M.E. in 1913.

George B. Preston

George Burton Preston was born at Corning, N. Y., on February 20, 1866. Mr. Preston was graduated with the degree of M.E. from Cornell University in June, 1888, and started his career at the Edison Laboratory, which was then the U. S. Electric Co., in about November of the same year. He was called to Cornell as instructor of engineering in 1891 and remained there until 1899, receiving in the meantime his M.M.E. At the end of this period he was appointed inspector of steam vessels by the State of New York. He resigned this position in 1906 to work for the Westinghouse, Church, Kerr & Co. The years 1913 to 1917 were spent in Columbia University in New York in the capacity of professor of steam engineering.

His work terminated with E. L. Phillips Co. of New York, where he was employed as consulting engineer on power-plant design and operation until his death on February 9, 1927. He was elected a member of the A.S.M.E. in 1891 and had held continuous membership for thirty-five years.

Charles F. Quincy

Charles F. Quincy was born at Newton, Mass., July 16, 1856, and died October 1, 1927, at his summer home in Center Harbor, N. H. He was graduated from the Newton High School. During most of his lifetime he was active in the railway supply field. From 1887 until his death, he was connected with the Q and C Co., for several years as treasurer and later as president.

Mr. Quincy became a member of the A.S.M.E. in 1922.

Edward A. Quigg

Edward A. Quigg was born on January 10, 1881, at Corona, Long Island, N. Y. He was a graduate of Stevens Institute of Technology. Upon graduation he entered the service of the Illinois Steel Company at Chicago, Ill., passing through the fabricating, designing, and estimating departments. In April, 1912, he was transferred to the Carnegie Steel Company, at Newark, N. J., and during the war was in charge of construction and erection of the Crucible Steel Company plant at Harrison, N. J. Later he was in charge of the construction

of several plants in Jersey City for the Wright and Kowalsky Construction Company as well as for the Kerloe Engineering Company of the same city. In the spring of 1924 he became connected with the Barnes Wire Fence Company of Detroit, Mich. It was here that his death occurred on April 22, 1927. He became a member of the A.S.M.E. in 1919.

Charles Edward Rogers

Charles Edward Rogers was born February 25, 1871. He was educated at the Green and Whitney Point high schools, and at Cornell University from which he was graduated in 1896. He served his apprenticeship with Fraser & Chalmers, Ltd., at Erith, Kent, England, and after two years was sent to Australia to represent their engineering firm there. He remained in Australia eleven years and then went to Johannesburg, South Africa, as manager of the branch of Fraser & Chalmers, Ltd. In 1913 he returned to London as manager of all the plants of Fraser & Chalmers, Ltd., and later managed the branch at South Africa, maintaining his office in London. He was killed by accident while duck-shooting at Whitney Point, N. Y., November 1, 1927.

He became a member of the A.S.M.E. in 1908.

Bruce B. Rollman

Bruce B. Rollman, general superintendent of the Ohio Cultivator Company at Bellvue, Ohio, died on March 19, 1927. He was born at West Sonora, Ohio, on July 26, 1877, and received his B.S. in M.E. from Purdue University in 1901. Upon graduation he became affiliated with the Westinghouse Air Brake Company's engineering staff. The next year he was a traveling salesman in the employ of the Westinghouse Machine Company. From 1903 to 1912 he was partner and proprietor of the Rollman Machine Works, doing specialty manufacturing and experimental design. He worked with the New Idea Spreader Company, Coldwater, Ohio, in 1912 as an experimental engineer. The Aircraft Division of the Union Switch and Signal Company, at Swissvale, Pa., employed him in 1919 as their chief inspector, and the Ohio Cultivator Company, Bellvue, Ohio, employed him as their general superintendent in 1920. Mr. Rollman became an associate member of the A.S.M.E. in 1917.

Spencer S. Rumsey

Spencer S. Rumsey, chief engineer for the Oliver Iron Mining Company, Duluth, Minn., died on September 8, 1927. He was born at Berlin, Wis., May 23, 1876. After graduating from the high school at Milwaukee, he entered the University of Wisconsin, from which he was graduated in 1897 in the Department of Civil Engineering. Following graduation he was for two years with the Allis-Chalmers Manufacturing Company, at Milwaukee. In 1899, he entered the employ of the Oliver Iron Mining Company at Ironwood, Mich., and was transferred to Duluth in 1901. On October 1, 1911, he was made chief engineer of the Oliver Iron Mining Company, with headquarters at Duluth, and held that position at the time of his death.

Mr. Rumsey took an active part in the progressive introduction of larger, heavier, and more efficient mining equipment in the Lake Superior iron mining districts. This involved larger and specially designed equipment for the open-pit mines on the Mesaba Range, consisting of railway locomotives, steam shovels, and stripping cars, and more recently the proper electrification of this and allied equipment.

Mr. Rumsey became a member of the A.S.M.E. in 1900. He was also a member of the American Iron and Steel Institute and the Lake Superior Mining Institute.

Sherman Sanders

Sherman Sanders was born August 18, 1881. He received his technical education at the Georgia School of Technology, Atlanta, Ga., and was for twenty years associated with his father in the Newell Sanders Plow Company. His principal work consisted of designing and directing the manufacture of agricultural implements on which he was an authority. He died October 2, 1927. He became a member of the A.S.M.E. in 1922.

Henry B. Sargent

Henry Bradford Sargent, of New Haven, Conn., well-known manufacturer and past vice-president of the A.S.M.E., passed away at the New Haven General Hospital on February 3, 1927. While Mr. Sargent had been in failing health since May, 1926, he continued to be active in his business up to within a week of his death, the immediate cause of which was septicemia.

Mr. Sargent was born in New York, N. Y., on March 4, 1851. The family removed to New Britain, Conn., in 1857, and located in New Haven in 1864, so he received his early schooling in both of these cities. He prepared for Yale at the New Haven High School.

Mr. Sargent was graduated from the Sheffield Scientific School of Yale University in 1871 with the degree of Ph.B. He was a very active man in college. In the summer and fall of 1870, while an undergraduate, he was a member of the paleontological expedition which under the direction of Prof. O. C. Marsh spent six months west of the Mississippi. One of his outstanding undergraduate achievements was to design and build the six-oared "Sheff" shell which created a sensation when it was rowed to victory by a "Sheff" crew of which Mr. Sargent was a member, in the Yale University Championship boat race on Saltonstall Lake on July 11, 1871.

After his graduation Mr. Sargent immediately entered the hardware-manufacturing concern of Sargent & Company of New Haven, in which his father was the moving spirit.

This industry had grown out of one founded by Elnathan Peck at New Britain in about 1833. The elder Sargent became interested in the business in 1855, and in July, 1864, he reorganized it in New Haven as a stock company composed of himself, his two brothers, and eight employees.

Mr. Sargent, from the time he was thirteen years of age, had worked in the factory during vacation, for it was his father's ambition to "get hardware into the blood" of his six sons. Beginning at the bottom, he proved his worth in various shop departments and in the drafting room. It was not long before he had worked his way to the important position of general inspector of product. At that point he began to have a constantly increasing responsibility in the executive end of the business.

The growth of Sargent & Company during Henry Sargent's fifty-five years' connection with it was such as to make it one of the largest industries in New Haven and one of the largest hardware-manufacturing companies in the world. As long ago as 1887 it employed 1700 persons, and today the number is around 3000. The number of separate items of hardware catalogued by the concern is approximately 20,000. Mr. Sargent was elected president of Sargent & Company in 1917, and held this position at the time of his death.

Mr. Sargent was a man of wide influence, not only as a successful manufacturer, but also as a very able and active figure in educational, civic, and society affairs. He maintained a deep interest in the affairs of Yale University, both athletic and academic. He served from 1878 to 1912 as a member of the Yale University Athletic Committee and for 19 years was treasurer of the Yale Field Corporation. He was elected a Fellow of the University by the alumni for three terms of six years each following 1902, and declined to run a fourth term.

Unlike his father, who served as mayor of New Haven from 1891 to 1895, Mr. Sargent did not seek political honors. He was, however, a member of the New Haven Common Council in 1883, 1884, and 1885. He was long a director of the Organized Charities and of the New Haven Dispensary, was a trustee

of the New Haven Savings Bank and a director of the old City Bank, retaining his directorship when it became the New Haven Bank until his death.

Mr. Sargent was a member of the Connecticut Academy of Arts and Sciences, of the Graduate, Lawn, and Country Clubs of New Haven, and of the Yale Club and Century Association of New York. In 1923 he was named a national councilor to represent the American Hardware Association in the U. S. Chamber of Commerce.

Mr. Sargent joined the A.S.M.E. in 1898, and was a very active and useful member of the Society. He served on many committees, took an active part in the founding and operation of the New Haven Section, and was deeply interested in the New Haven Machine Tool Exhibition. He was a Vice-President of the Society from 1918 to 1920.

Hugh A. Schaufus

Hugh A. Schaufus was born at Cleichan, Germany, on April 3, 1881. He received his early education in the schools of Waltham, Mass., and in 1908 entered the employ of the Metz Automobile Company as machine designer. In 1912 he was promoted to the position of efficiency engineer and in 1915 became production manager. In 1917 he became associated with the American Voting Machine Company. In 1920 he returned to the Metz Automobile Company as master mechanic, where he remained until 1925 when he joined the Waltham Watch Company as machine designer. He held this position at the time of his death on October 9, 1927. He became a member of the A.S.M.E. in 1917.

Charles E. Shadall

Charles Edward Shadall, inventor, designer, and steam-engine expert for the Nordberg Manufacturing Company, died at his home in Milwaukee, Wis., on February 10, 1927. Mr. Shadall was born at Kyrsklätt, Oferby, Finland, on April 11, 1859. He was graduated with high honors from the university at Helsingfors in 1879 and then spent two years in the army before starting on his engineering career. He received a year's shop experience in Finland, and his drafting room practice was received at St. Petersburg, Russia. Mr. Shadall had experience in Birkenhead, England, before he took his first position in the United States, which was with the Crane Company of Chicago, Ill. He spent one year with E. P. Allis Co. of Milwaukee and was later employed by File and Stowell, Milwaukee, and Frick Company, Waynesboro, Pa.

Mr. Shadall had been with the Nordberg Company for twenty years with the exception of two occasions; once when he was called to the shipyard at Waynesboro, Pa., on government service during the War and the other to Pittsburgh, Pa., to work on ventilating equipment.

Mr. Shadall became a member of the A.S.M.E. in 1912.

Gershom Smith

Gershom Smith, vice-president of the Tabulating Machine Company, died on September 4, 1927. He was born in London, England, in February, 1862, and was educated in England, but came to this country forty-five years ago. His first position was with the Gurney Hot Water Company, Boston, as assistant treasurer, where he remained until 1891, when he joined the Pope Manufacturing Company of Hartford, Conn., starting as factory accountant and advancing to auditor. He left there in 1900 to become comptroller of the Pennsylvania Steel Company, where he remained until 1911 when he became vice-president and general manager of the Tabulating Machine Company. In 1918 he became associated with the quartermaster general's office and after the War joined the organization which General Goethals established in New York City. At the time of his death he was affiliated with Searle, Oakley & Miller, in public practice.

He became an associate member of the A.S.M.E. in 1917.

Jesse M. Smith

Jesse Merrick Smith, retired consulting engineer and President of the A.S.M.E. in 1909, passed away on April 1, 1927, at his home in New York City, at the age of seventy-eight. He joined the Society in 1883 and served as Manager from 1891 to 1894, as Vice-President from 1894 to 1896 and from 1899 to 1901, and on the Council under the presidencies of Hunt, Loring, Cox, Davis, Billings, Fritz, Melville, Morgan, and Wellman.

Jesse Merrick Smith was born at Newark, Ohio, October 30, 1848. After studying at Philo Patterson's School in Detroit, he entered the Rensselaer Polytechnic Institute at Troy, N. Y., in 1865, and from there went to the Ecole Centrale des Arts et Manufactures, Paris, receiving the M.E. degree in 1872. On his return to the United States he entered professional work in the Hocking Valley, Ohio, building blast furnaces and coal mines. He remained at this work until 1880, at which time he opened a consulting engineering office in Detroit, Mich., and devoted his time to designing special machinery as well as manufacturing and power plants in connection with manufacturing establishments.

During the latter part of his consulting work in Detroit he entered the field of patent litigation and became an expert in a number of important suits. In 1898 he moved from Detroit to New York, in which city he opened an office as a consulting engineer and expert in patent litigation.

Mr. Smith was a charter member of the American Institute of Electrical Engineers, and for many years was a member of the American Institute of Mining and Metallurgical Engineers. He was president of the American branch of the Alumni of the Ecole Centrale. As a graduate of this celebrated school he became a member of the Société des Ingénieurs Civils de France.

Mr. Smith was a very active member of the A.S.M.E., and participated in several of its conventions with the foreign engineers in Europe and represented it at many international meetings. During his connection with the Society he was closely identified with the development of the Constitution and By-Laws and the fundamental principles of present-day Society activities. It was during his connection with the Council and under his presidency that the Local Sections of the Society were developed. Starting with the organization of a section in Milwaukee, the section established in St. Louis in 1909 was followed by one in Philadelphia in 1912 and another in St. Paul in 1913. The importance of the local-section movement indicates very clearly the breadth of vision of Mr. Smith and his associates. As representative of the Society Mr. Smith took an important part in the dedication of the Russell Sage Laboratory of Mechanical and Electrical Engineering at the Rensselaer Polytechnic Institute.

Mr. and Mrs. Smith traveled extensively during the last eight years, spending much time in Europe. During this residence abroad Mr. Smith represented American engineers at many conferences and engineering celebrations.

Merrill Van G. Smith

Merrill Van G. Smith, dean of engineering of the University of Delaware, died on April 24, 1927, in Philadelphia, Pa. He was born in September, 1871, and obtained his early education in the public schools of Montclair, N. J., and afterwards attended Stevens Institute at Hoboken, N. J., from which he was graduated with the degree of M.E., class of 1896.

After graduation, Dean Smith joined the editorial staff of the *Railway Age Gazette.* His next venture was in 1898 in the field of teaching as instructor in mechanical engineering at the University of Pennsylvania. After a year at this institution, Dean Smith became professor of mechanical engineering at the Clarkson School of Technology. Going to the University of Delaware from Clarkson in September, 1904, he served the University as professor of mechanical engineering and for the past six years as dean. He has been a contributor to mechanical publications in matters relating to navigation.

He was a member of the Society for the Promotion of Engineering Education, the Engineers' Club of Philadelphia, and became a member of the A.S.M.E. in 1915.

Herman F. Sobeck

Herman Frederick Sobeck was born August 29, 1899, at Cokeville, Pa., and was killed in an explosion November 14, 1927. He was educated at the Blairsville, Pa., high school and Carnegie Institute of Technology from which he was graduated with the degree of B.S. in mechanical engineering in 1921. From August, 1921, until January, 1922, he was engaged in appraisal work on the property of the People's Natural Gas Company under the supervision of Dartnell Eaton, New York, N. Y. In January, 1922, he entered the employ of the Jeffrey Dewitt Insulator Company, Kenova, W. Va. He began work as operator in the drying department and was later made foreman of the casting department, one of the research engineers in charge of work on vacuum casting and foreman of the milling department. He left them in January, 1924, to enter the employ of the Riter Conley Company, Pittsburgh, Pa., where he worked in various capacities in order to become familiar with all phases of the work, and had been loaned by this company to the Equitable Gas Company for special engineering work at the time of his death.

He became a junior member of the A.S.M.E. in 1925.

Henry Spencer Spackman

Henry Spencer Spackman was born March 12, 1866, in Williamsport, Pa. He was educated at the Episcopal Academy, Philadelphia, and under private tutors. In March, 1887, he entered the service of James W. Queen & Co., Philadelphia, manufacturers of and dealers in scientific instruments and was connected with the mathematical department of that firm until August, 1890, when he resigned in order to take a position in the engineering department of the Pennsylvania Railroad under Joseph T. Richards, engineer of the maintenance of way. In the autumn of 1893, he was appointed engineer in charge of construction of the new State Library and executive buildings, Harrisburg, under John T. Windrum, architect. On the completion of the work, he was appointed, March, 1895, inspector of masonry and bridges, City of Philadelphia. In March, 1896, he entered the service of John T. Windrum, architect. In July, 1897, he became a member of the firm of Lathbury and Spackman, engineers and chemists. From July, 1904, until his retirement, June 14, 1920, he was president of the Henry S. Spackman Engineering Company.

Both Lathbury & Spackman and the Henry S. Spackman Engineering Company, in addition to their general engineering practice, maintained chemical and physical laboratories for the testing and inspection of engineering materials of all descriptions. They specialized in the designing, construction, and operation of plants for the manufacture of cement and lime, and took a prominent part in the development of the Portland cement industry, designing and constructing Portland cement mills, not only in the United States, but also in Canada, Mexico, Cuba, New Zealand, and Europe. Mr. Spackman was recognized as an authority on both the manufacture and use of Portland cement and contributed many articles to the technical press. He invented a quick hardening aluminite cement manufactured by the Atlas Company under the name of "luminite."

June 19, 1917, Mr. Spackman joined the United States Army and was commissioned major engineer. In March, 1918, he was appointed chief of cement section, engineering purchasing office, Service of Supplies, A.E.F. In August he was appointed commanding officer, cement mill companies, Army Service Corps, A.E.F., and in September, he was commissioned lieutenant-colonel, Corps of Engineers. On July 24, 1919, he was decorated by the French government with the Cross of the Legion of Honor. Among his duties while in the army was the direction of the operation, with engineer troops, of seven cement mills in France, the cement produced being for the joint use of the French and American armies.

He died after a long illness at his home in Ardmore, Pa., December 21, 1927.

He was a member of the American Society for Testing Materials, the Franklin Institute, the Concrete Institute, and the Engineers Club of Philadelphia. He became a member of the A.S.M.E. in 1899.

Arthur B. Steen

Arthur B. Steen was born on September 27, 1864, at Marietta, Ohio. He was educated in Cincinnati, and received his early training in Cincinnati and Hamilton machine shops. In 1888 he entered the employ of the National Transit Company, Oil City, Pa., where he remained for twenty-four years, advancing during that time to the position of general manager. He left Oil City for the South in 1913 to serve as consulting mechanical engineer for the producing department of the Texas Company, with headquarters at Houston, Texas. He held this position at the time of his death on October 28, 1926. For two years prior to his death, Mr. Steen was engaged in the work of the American Petroleum Institute as chairman of the national committee on boiler standardization.

He became a member of the A.S.M.E. in 1903.

Allan Stirling

Allan Stirling, noted boiler inventor and one of the original members of the A.S.M.E., died on February 3, 1927, at his home in Norfolk, Va.

Mr. Stirling was born on July 25, 1844, at Rutherglen, Scotland. He began his education in the public schools of his native village and later attended the High School of Glasgow. In 1860 he came to America and completed his education at the Cooper Institute in New York. He received the degree of B.S. in M.E.

In the meantime he was employed at the DeLamater Iron Works in New York, having been given a position there as draftsman through the recommendation of John Baird, chief engineer of the Cromwell Line. His first work was to make the drawings of the new DeLamater offices on Thirteenth Street, and later to superintend the removal of the drafting room from the old office on West Street to the new headquarters.

In 1862 Mr. Stirling entered the emergency drafting office which the Navy Department established at Broadway and Franklin Streets, near the home of Capt. John Ericsson, where improved designs for monitors were being worked out. The young engineer was assigned to the design of the blowing engines which supplied air below decks and also worked out plans for gun carriages used in the turrets.

When this Government office was closed at the end of the Civil War, Mr. Stirling spent a year in the machine shop of Anderson & McLaren on Horatio Street in New York in order to gain practical shop experience. At the end of that year he became a draftsman for the firm of Winslow, Griswold & Holley, in Troy, N. Y., in connection with the construction of the first bessemer steel works erected in the United States.

When this task had been completed, Mr. Stirling remained in Troy as draftsman and superintending engineer for the Burden Iron Works. He remained with that concern for eleven years, leaving them in 1878 to take charge of the mechanical department of the Metropolitan Elevated Railway in New York. After the consolidation of this road with the New York Elevated Railway, he continued the same position with the latter organization, and renewed his associations with Mr. DeLamater, much of the railway's repair work being done at his shops.

In 1880 Mr. Stirling left the Elevated with the intention of becoming an engineering specialist. After studying the possibilities of various branches (including the new field of electric power), he finally selected that of the steam boiler as offering the best possibilities. In the meantime he designed and built for the Rathbun Company, at Deseronto, Ont., one of the earliest cable conveyors, and also laid out a foundry and machine shop for Coxe Bros., at Drifton, Pa.

In 1883 Mr. Stirling interested his old friend Mr. DeLamater in a unique boiler which he had designed for a working pressure of 300 lb. per sq. in. One was built and operated at the DeLamater Iron Works, but proved to be somewhat "ahead of its time" and the design was given up.

Following this experiment Mr. Stirling served for a year as mechanical engineer for the Otis Elevator Company. Next he again became consulting

engineer for the Rathbun Company upon plant improvements, and in carrying out this work he installed boilers of his new design with certain refinements. The success of these led him to establish himself in the boiler business in Canada. The design of the "Three-Drum Stirling" boiler came into his mind during a night ride on a Canadian train. This resulted in the well-known "Four-Drum Stirling" patented by him in 1892, for the manufacture of which the International Boiler Company was established.

Mr. Stirling retired from active business several years ago but still kept up his interest in the boiler business by designing an occasional boiler for an old customer and seeing that a supply of repair parts was maintained.

At the invitation of the late Alexander Holley, Mr. Stirling joined the A.S.M.E. at its inception in 1880 and presented a paper on steam boilers at its first meeting. He served as Manager from 1881 to 1884 and as Vice-President from 1885 to 1887. He was a life member of the Society.

Charles C. Stutz

Charles C. Stutz, secretary of the American Institute of Weights and Measures, died suddenly at his home in New York on January 29, 1927. He was born in Naples, Italy, in 1861 and was educated at the Polytechnic School in Switzerland. He came to America in about 1882 as a draftsman and in 1888 entered the employ of Browne & Sharpe Mfg. Co., and soon became their assistant chief draftsman. In 1892 he again returned to Europe to become general manager of the Ducommen Works of the Steinlen Company at Mulhausen, Alsace. His attachment to America was strong and he soon returned to be engineer for the Sprague Electric Company. While in this capacity he designed the underground system of the London Central Railway. In 1908 he was assistant chief engineer of the Pittsburgh Plate Glass Company.

Soon after the close of the World War he became identified with the American Institute of Weights and Measures and in 1920 became secretary of the organization. He also held the position of research engineer for the Goodyear Tire and Rubber Company in 1922. He was a member of the American Institute of Electrical Engineers and became a member of the A.S.M.E. in 1900.

George B. Thomas

George B. Thomas died at Bridgeport, Conn., on September 8, 1927. He was born at Rockville, Conn., in May, 1869. After several years' experience as repair machinist, he entered the employ of the Chatfield & Woods Paper Bag Co., Cincinnati, adjusting and designing paper-bag machines. In 1892 he became foreman of the commutator department of the Mather Electric Company, Manchester, Conn. In 1895 he took charge of the tool makers and machine shop of the Perkins Electric Switch Mfg. Co., Hartford, Conn., was later made master mechanic of this company, and, from 1906 to 1910, was master mechanic of both this company and the Bryant Electric Company, Bridgeport, Conn. In 1914 he was made mechanical engineer and designer of the Bryant Electric Company, the position he held at the time of his death.

Mr. Thomas became a member of the A.S.M.E. in 1914.

Albert E. Thorpe

Albert E. Thorpe was born on September 21, 1892, at New Haven, Conn., and died at Whitneyville, Conn., November 30, 1926. He was educated at the Sheffield Scientific School, Yale University, from which he was graduated with the degree of Ph.B. in 1913.

After graduation he spent ten months with the Chain Belt Company, Milwaukee, Wis., on apprentice course work consisting of assembling and erection of elevators and conveyors, machine-shop work, and designing elevators and conveyors. In 1915 he joined the Winchester Repeating Arms Company, New Haven, Conn., as designer of jigs, fixtures, and machinery for gun and cartridge manufacture. Later he was promoted to planning overseer in junctional organization in the department of manufacturing rifle parts. In October, 1916,

he was made general foreman of the department manufacturing rifle parts, where his duties consisted of the development of methods and the design of tools and equipment needed for various new rifles. He held this position at the time of his death.

Mr. Thorpe became a junior member of the A.S.M.E. in 1916.

George H. Thurston

George Henry Thurston died at London on July 10, 1927, in his fifty-eighth year. He was born in Australia and secured his technical education at the Ballaret East Technical School. His early engineering experience was obtained in Australia and the United States. In 1892 he went to South Africa where he joined the firm of Eckstein & Co., Ltd., resigning in 1905 to join the Consolidated Gold Fields of South Africa, Ltd. His transfer to their London office as consulting electrical and mechanical engineer took place in 1910 and he retained this position until the time of his death. He also carried on a business as a consulting electrical and mechanical engineer, and in 1912 was responsible for the electrification of the cotton mills of E. D. Sassoon & Co., Ltd., at Bombay, India. Mr. Thurston served in the Boer War in the Railway Pioneer Regiment. He was taken prisoner but escaped and was afterwards transferred as staff officer under the director of railways.

He became a member of the A.S.M.E. in 1918.

James Addison Tilden

James Addison Tilden was born at New Boston, N. H., November 2, 1862, and died at Hyde Park, Mass., September 26, 1927. He was educated in the schools of Hyde Park and entered the employ of Hersey Brothers, South Boston, Mass., as apprentice. His entire business life, except for a very short time when he was assistant to Mr. Hoadley, one of the founders of the A.S.M.E., was spent with the Hersey Manufacturing Company and its predecessors, the Hersey Meter Company and Hersey Brothers. At the time of his death, he was vice-president and general manager of the concern. Mr. Tilden possessed unusual mechanical and inventive ability and gradually developed his skill as an inventor, especially in the line of water meters, for which he was granted over fifty patents by the United States Patent Office. His inventions contributed largely to the building up of the large water meter industry of his organization.

He was a member of the American Water Works Association, the New England Water Works Association, and the Engineers Club of New York. He became a member of the A.S.M.E. in 1885.

James Todd

James Todd was born at Greensburgh, Pa., July 24, 1861, and died at Pittsburgh, June 8, 1927. He was educated at the Western University of Pennsylvania (now the University of Pittsburgh) and at the University of Pennsylvania, both as a chemist and engineer. After leaving college he was connected with the steel industry at Pittsburgh, working in the plants of the Black Diamond Steel Works and of Park Brothers. Shortly after 1891 Mr. Todd became interested in the study of electrical insulating varnishes and this led to the establishment, in 1894, of The Sterling Varnish Company, of which he was president until his death. By 1898, Mr. Todd had placed his materials in practically every large electrical plant throughout the world and he was generally conceded to be the dean in his particular field. About 1900 he began a series of experiments using oxygen as a means of combating disease and published for private circulation two books containing his experiments. This work was turned over by Mr. Todd to the University of Maryland where it is being continued in a laboratory there bearing his name.

Mr. Todd was a member of the American Society of Heating and Ventilating Engineers and of the American Chemical Society. He became a member of the A.S.M.E. in 1911.

Carleton W. Tupper

Carleton W. Tupper was born at Denver, Colo., May 31, 1886. He was educated in the public schools of Denver and graduated from Purdue University with the degree of B.S. in mechanical engineering in 1909. His first position was as draftsman and construction foreman for H. M. Byllesby, Chicago, Ill. In 1911 he became assistant chief draftsman for Sargent & Lundy, Chicago, Ill., with whom he remained until 1914, when he entered the employ of the Public Service Company of Northern Illinois, Chicago, Ill., as assistant engineer in charge of inventory of all buildings and mechanical equipment. Later he was placed in charge of design and construction of alterations to existing buildings and equipment.

In February, 1917, he was appointed mechanical engineer of the Sanitary District of Chicago in charge of the operation and maintenance of steam power and sewage pumping stations. The following year he became draftsman on powder plant design with Graham, Anderson, Probst & White, New York, N. Y. In May, 1918, he became assistant superintendent of E. I. du Pont de Nemours & Co., Nashville smokeless powder plant, first in charge of construction of the power plant and later operating engineer in the boiler plant. In January, 1918, he entered the employ of the Westinghouse Electric & Manufacturing Co. as stoker application engineer at the South Philadelphia works. He had charge of the engineering work relative to the application of stokers to boilers. In October, 1920, he was appointed district stoker engineer in charge of all stoker erection, discussion of engineering matters with customers and sale of repair parts in the district around New York City with a radius of approximately seventy-five miles. Later he joined the Combustion Engineering Corporation, New York, N. Y., as chief draftsman, the position he held at the time of his death, December 12, 1927.

He was elected a member of the A.S.M.E. in 1922.

Perley F. Walker

Dean Perley F. Walker was born at Embden, Me., April 21, 1875, and died at Lawrence, Kan., October 17, 1927. He was graduated from the University of Maine in 1896 with the degree of S.B. in mechanical engineering and received the degree of M.E. in 1900 from the same university. In 1901 he received the degree of Master of Mechanical Engineering from Cornell University. He was appointed professor of mechanical engineering at the University of Kansas in 1902 and became dean of the School of Engineering in 1913. During the World War he served in the U. S. Army as commanding major of the 109th Engineers and later as colonel and commander of the 219th Regiment. He received his honorable discharge February 21, 1919, and again became dean and professor of mechanical and industrial engineering at the University of Kansas.

Dean Walker was active as a consulting engineer for petroleum and power engineering and on industrial development possibilities, and was the author of "Management Engineering," published in 1923, and co-author of "Industrial Coal, 1924," a report on the results of the coal storage investigation carried on by the Federated American Engineering Societies. He was also the author of an Industrial Survey of Kansas and of bulletins on Kansas coal and natural gas, as well as contributor to many technical publications.

He was a member of the American Military Engineers, Kansas Engineering Society, Society for the Promotion of Engineering Education, of which he was president in 1923 and 1924, Kansas Academy of Science, American Management Association, and Sigma Xi. He became a member of the A.S.M.E. in 1908.

Walter Burgess Warren

Walter Burgess Warren was born at West Newton, Mass., 1873, and died at Cambridge, Mass., December 9, 1927. He was educated at the University of Pennsylvania where he received the degree of B.S. in mechanical engineering in 1895. He served his apprenticeship with the Warren Scharf Paving Company from 1895 to 1896. In 1897 he worked in the drawing room of the

plant at Long Island City. The next year he was appointed assistant superintendent and the following year was made superintendent. From 1899 to 1901 he served as superintendent of the Warren Burnham Company. In 1901 he was made general manager and director in general charge of all operations of the construction department throughout the United States and Canada. In 1907 he became vice-president and director in charge of operations on the Pacific Coast with offices at Portland, Oregon. Later he returned East as vice-president and member of the executive committee of the Warren Brothers Company, Cambridge, Mass., the position he held at the time of his death.

Mr. Warren became an associate member of the A.S.M.E. in 1901 and a member in 1914.

Christian H. Westen

Christian H. Westen was born November 17, 1871, in New York, N. Y., and died October 26, 1927. He was educated in the public schools and at Cooper Union, where he studied mechanical drafting for four years. In 1891 he entered the employ of the Garvin Machine Company, New York, as machinist. He advanced to the position and later was put in charge of the tool department as assistant superintendent. In 1904 he became associated with Hartford Suspension Company as factory manager, installing machine equipment for the manufacture of shock absorbers. He developed the Hartford Shock Absorber and was responsible for the introduction and marketing of the device.

In 1910 Mr. Westen established the Westen Manufacturing Company, manufacturers of shock absorbers. He served the new concern as superintendent and general business manager. In 1912 he became connected with the Garvin Machine Company as mechanical expert, engaged in the planning of machine and tool equipment for various manufacturing concerns. In 1913 he was employed by the E. J. Manville Machine Company, of Waterbury, Conn., as factory superintendent, supervising the construction and development of automatic machinery. In 1916 he was employed in the Hoboken plant of the Remington Arms Company as superintendent of the department devoted to the manufacture of small arms ammunition. The next year he joined the Roe Calk Company, Plantsville, Conn., as general superintendent in complete charge of the installation of new machinery and rotary furnaces. In 1919 he went to the Arrow Motor & Machine Co. as superintendent and remained there until 1922 when he accepted a similar position with E. V. Hartford, Inc. In 1924 he was employed by the Jewitt Manufacturing Corporation as superintendent engaged in developing and manufacturing a line of low loss condensers and radio apparatus. In 1926 he became general superintendent of the Peerless Unit Ventilating Company, the position he held at the time of his death.

He became an associate member of the A.S.M.E. in 1925.

Henry V. Wille

Henry V. Wille, consulting vice-president of The Baldwin Locomotive Works and the Standard Steel Works Company, died in Philadelphia, November 29, 1927. He was born in Philadelphia, May 23, 1869, and received his early education in the public schools there, graduating with the class of 1888 from the Central High School. He entered the engineering school of Cornell University, receiving the degree of M.E. with the class of 1892. His first employment was with J. W. Queen & Co., manufacturers of optical equipment at Ardmore, Pa. In 1893 he entered the employ of The Baldwin Locomotive Works in the test department. He assisted in locomotive road tests made in that year on the Long Island Railroad and was later placed in charge of the chemical laboratory. In 1895 he was made engineer of tests. Following this Mr. Wille had a wide experience as engineering advisor to the executives of the company. He traveled extensively in many parts of the world to investigate the problem of railroad operation in order to improve railroad performance. In 1916 he was made assistant to the senior vice-president and in 1917 he was appointed consulting engineer of the Eddystone Munitions

Corporation and the Remington Arms Company of Delaware. From 1922 until the time of his death Mr. Wille was consulting vice-president in engineering and metallurgy for The Baldwin Locomotive Works and the Standard Steel Works Company. He contributed a number of papers to the technical press and also served for some time on the locomotive section of the Boiler Code Committee, A.S.M.E.

He became a member of the A.S.M.E. in 1900.

Irving Williams

Irving Williams, who at the time of his death was sales engineer of the injector department of William Sellers & Co., Inc., Philadelphia, Pa., was born on June 21, 1880. He received his degree of M.E. from M. I. T. in 1903. In 1905 he entered the employ of the Pennsylvania Railroad Shops at Altoona, Pa., as special apprentice, and in 1904 was made assistant store-house keeper there. Among the positions he held with the Pennsylvania Railroad were inspector with test department, working on specifications, 1909; Altoona machine shops, motive-power inspector in charge of addition and betterments and repairs to buildings, fixtures and grounds, 1909-1911; engine-house foreman at Olean, N. Y., 1911-1912; engine-house foreman at Phillipston, Pa., 1912-1913; assistant master mechanic of Cumberland Valley Division at Chambersburg, Pa., 1917-1920; assistant master mechanic of Middle Division at Altoona, Pa., 1920-1921; and the same position with the Philadelphia Division at Harrisburg, Pa., 1921-1924.

He resigned in 1924 to accept the position of sales engineer with the Sellers Co., which he held at the time of his death in Harrisburg, Pa., on March 11, 1927. Mr. Williams became a member of the A.S.M.E. in 1913. He was also associated with the Pittsburgh Railroad Club.

James E. Wilson

James Edward Wilson, for many years mechanical engineer with the National Lock Washer Company of Newark, N. J., died on February 10, 1927, in New York, N. Y. He was born in Springfield, Mass., on August 15, 1841. In his early life he was with the Wheeler & Wilson Sewing Machine Works as machinist, toolmaker, and sub-contractor. He spent three years in the study and practice of dentistry, two years in mercantile business and two years as bookkeeper for the Bridgeport Manufacturing Company. He also designed and built machinery with this company before he became mechanical superintendent of the De La Vergne Refrigerating Machine Company, New York, N. Y. Here he was engaged in the construction, manufacture, and erecting of refrigerating and ice-making plants, later affiliating with the National Lock Washer Company. Mr. Wilson became a member of the A.S.M.E. in 1887.

Charles R. Wood

Charles R. Wood, sales engineer and director of R. D. Wood & Co., Philadelphia, Pa., died in Chicago, Ill., on June 8, 1927, while attending the convention of the American Water Works Association. Mr. Wood was born in Rome, Italy, on March 1, 1871, and was educated at Brown's Preparatory School, Philadelphia, and Haverford College, being graduated in 1888. Upon leaving college, he found employment with the Malaga Glass & Manufacturing Co., Malaga, N. J., and rose to the position of general manager. From 1890 until the outbreak of the Spanish American War, he was connected with the Florence Iron Works and the Camden Iron Works of R. D. Wood & Co., Philadelphia, Pa., remaining two years in the machine shop, one year in the pattern shop, one year in the cost department, and one year in the foundry.

Shortly after the war he returned to that company from which time he had charge of the hydrant and valve department, assuming the responsibilities of its growth and development.

Mr. Wood was a member of the American Society for Testing Materials, the American Iron and Steel Institute, the American Institute of Mining and Metallurgical Engineers, and the American Water Works Association. He became a member of the A.S.M.E. in 1923.

George E. Woods

George Edward Woods, one of the country's foremost engineers in the field of gas operation, died at his home at Astoria, L. I., February 5, 1927. He was born at Henderson, Ky., February 15, 1870. When he was a child his parents moved to Evansville, Ind., where he attended school, and, at the age of fourteen, entered the employ of the Evansville Gas and Electric Company. In 1889 Mr. Woods entered the employ of the Detroit Gas Company, where he became assistant superintendent, resigning that position in 1891 to become secretary and manager of the Pulaski Gas Light Company and the Little Rock Electric Light Company, Little Rock, Ark. Six months later he became associated with the Standard Gas Light Company of New York, N. Y., as assistant engineer. In 1896 he was made chief engineer of that company and, two years later, general superintendent. Still retaining his position with the Standard Company, Mr. Woods, in March, 1901, became engineer of manufacture for the Consolidated Gas Company of New York and later assistant chief engineer.

In 1922 he succeeded the late William H. Bradley as chief engineer of the Consolidated Gas Company and was elected president of the Astoria Light, Heat, and Power Company, and until January, 1925, when he resigned, he was president of the Central Union Gas Company. At the time of his death Mr. Woods was consulting engineer of the New York and Queens Gas Company and the Westchester Lighting Company and treasurer of the National Coke and Coal Company.

Mr. Woods was a member of the American Gas Association, the Society of Gas Engineering (of which he was president for fifteen years), the old Society of Gas Lighting, and the Illuminating Engineering Society. He became a member of the A.S.M.E. in 1914.

Ira H. Woolson

Ira Harvey Woolson of Summit, N. J., who was consulting engineer of the Committee on Construction of Buildings of the National Board of Fire Underwriters for the last seventeen years and chairman of the Building Code Committee of the Department of Commerce, died suddenly in Chicago on May 8, 1927.

Professor Woolson was born on August 11, 1856, at Lewiston, N. Y. He was graduated from the School of Mines, Columbia University, in 1885, and after serving on the New Jersey Geological Survey for two years returned to Columbia University as assistant in drawing. Here he remained until 1910 when he was named official investigator of building materials for New York City. During the latter years of his university career he established at Columbia the fire-testing station which was one of the pioneers in the country. For twenty years he was in charge of the general testing laboratory at the university which became one of the best-known research and commercial laboratories in the country. He developed there a number of the now standard methods for fire testing. In 1910 he was named by the National Board of Fire Underwriters as its consulting engineer. In 1918 he served as a consulting engineer with the War Industries Board. Shortly before his death Professor Woolson made a survey with the state architect of all the state hospitals at the request of Governor Smith.

Professor Woolson was a member of the American Engineering Standards Committee, the American Concrete Institute, National Fire Protection Association, and the American Society for Testing Materials. He became a member of the A.S.M.E. in 1896.

Charles Henry Zehnder

Charles Henry Zehnder was born in Northumberland County, Pa., on April 16, 1856, and died December 26, 1927. He was educated in the common schools of his native town and at Danville, Pa., Academy. Upon leaving school, Mr. Zehnder entered the employ of the Danville National Bank as clerk and bookkeeper and spent four years in this business. He became assistant secretary of the Y.M.C.A. of Harrisburg, Pa., and general secretary of the same

association at Norristown, Pa. He then went to the Jackson-Woodin Manufacturing Company at Berwick, Pa., as secretary to the vice-president, gradually working through the various offices as secretary, general manager, and finally becoming president of this corporation. He spent about fifteen years in this capacity and then became president of the Dickson Manufacturing Company at Scranton, Pa., remaining there until the consolidation of this corporation made with the Allis-Chalmers Company, mainly through his efforts. They later sold the locomotive-building branch of this business to the American Locomotive Company.

After severing his connections with the Dickson Manufacturing Company, Mr. Zehnder organized the Alleghany Ore & Iron Company of Virginia, operating blast furnaces at Buena Vista, Iron Gate, and Shenandoah. He later sold this enterprise to the Lukens Iron & Steel Company at Coatesville, Pa. He was interested in coal mining in West Virginia, and served as president of The Austen Coal & Coke Co. of West Virginia for many years. He was one of the organizers of the Black Mountain Corporation, a company owning 35,000 acres of land in Kentucky and Virginia and operating a large coal industry in Kentucky. He organized the Benedict Coal Corporation on Benedict Creek in Virginia, producing a high grade of bituminous gas coal. He was president of this corporation until the early part of 1925 when the company was sold to the Bewley-Darst Company of Knoxville, Tenn.

Apart from these activities, Mr. Zehnder was president and director of the Mount Hope Mineral Railroad Company of New Jersey, a director of the Scranton Bolt & Nut Company of Scranton, Pa., director and member of the finance committee of the Equitable Life Assurance Society of the United States, director of the Empire Trust Company and Empire Safe Deposit Company of New York, director of the Arkansas Valley Sugar Beet and Irrigated Land Company of Colorado, director of the Warren Foundry & Pipe Corporation, Replogle Steel Company, Wharton & Northern Railroad, Victoria Coal & Coke Company, Windsor Land Corporation, and Staken Plains Trust, Limited.

He was a member of the American Institute of Mining and Metallurgical Engineers, The Merchants Association of New York, the Chamber of Commerce of the State of New York, and The Franklin Institute of Pennsylvania. He became a member of the A.S.M.E. in 1890.

INDEX TO VOLUME

PAGE

Administration of the Society 33
Admission to the Society 34
Aeronautic Division, National Meeting 106
ALLERTON, ROBERT W., Obituary 241
American Association for Advancement of Science, A.S.M.E. Representatives on 79
American Engineering Council 60
  A.S.M.E. Delegates to 79
  Council Report on 27
American Engineering Standards Committee 60
  A.S.M.E. Representatives on 79
  Council Report on 27
  Function of 51
A.S.M.E. Financial Report 121
A.S.M.E. Medal, Presentation to Wilfred Lewis 86
A.S.M.E. News 39
A.S.M.E. Representation on Other Bodies 29, 80
American Society of Refrigerating Engineers, Joint Meeting with .. 84
Annual Dinner of the Society 94
Annual Meeting, Joint Sessions at 92
  Papers Presented at 99
  Report of 92
  Technical Sessions at 98
Annual Meetings, Scope of 37
Annual Report of Council 22
Appointments, Special 29
Auxiliary, Woman's 67
Awards Committee 70
  Report of 131
Awards, Junior and Student, Presentation of 83
Awards of the Society 45
  Council Report on 25

Badges of the Society 36
BARE, BERT, Obituary 241
BARNABY, CHARLES W., Obituary 241
BAYNE, FREDERICK WILLIAM, Obituary 242
BEALE, HORACE A., JR., Obituary 242
BENEDICT, BRUCE W., Obituary 242
BERG, PER TORSTEN, Obituary 242
Biographies 40
Biography Advisory Committee 73
BLAIR, FRANK K., Obituary 243
Boiler Code, International 59
Boiler Code Committee 72
  Report of 151
Boiler Code Committees, List of 78
Boiler Code Work, General Information on 58
BRADY, JOSEPH H., Obituary 243

PAGE

BROIDO, BENJAMIN N., Obituary 244
BRUNTON, DAVID W., Obituary 244
Buffalo, Report of Aeronautic Meeting at 106
BUJARSKI, RUDOLF E., Obituary 245
BURCHARD, ANSON W., Obituary 246
Business Meetings 37
  Reports of 83
By-Laws of the Society 203

CAPEN, THOMAS W., Obituary 246
CARTER, DONALD PERSHING, Obituary 246
CARY, ALBERT A., Obituary 247
CHAMPION, HARRY W., Obituary 247
CHILDS, GEORGE W., Obituary 247
CHURCH, WILLIAM L., Obituary 248
Code of Ethics 65
Codes of the Society 40
  See also Boiler Codes, Power Test Codes, Safety Codes
Colleges, Relations with. *See* Relations with Colleges
COLLINS, MORRIS R., Obituary 248
Committees, Boiler Code. *See* Boiler Code Committees
  Power Test Codes. *See* Power Test Codes Committees
  Reports of 120
  Research. *See* Research Committees
  Safety. *See* Safety Committees
  Special 72
  Standing 70
  Standardization. *See* Standardization Committees
  Technical, Council Report on 24
Condensed Catalogues of Mechanical Equipment 39
CONLIN, BERNARD A., Obituary 248
Constitution 199
Constitution, By-Laws and Rules, Adoption of and Amendments to ... 33
  Index to 232
Constitution and By-Laws Committee 34, 70
  Report of 131
COUCH, FREDERICK F., Obituary 248
Council of the Society 33, 69
  Executive Committee of, 1927 69
  Executive Committee of, 1928 92
  Presentation of Report of 83
  Report of 22
  Reports of Meetings of 85, 92, 103, 104, 114
Courtesies, Exchange of 29, 66
COVELL, GRANT A., Obituary 249
COVELL, HARRY N., Obituary 249
CRAWFORD, CHARLES W., Obituary 249

DINGENS, CARL L., Obituary 250
Discussion of Meeting Papers 38
DODDS, WILLIAM E., Obituary 250
DOUGLAS, COURTNEY C., Obituary 250
DOW, ALEX, Installation as President 92
DURYEA, JESSE T., Obituary 250

PAGE

Education and Training for the Industries Committee 71
Report of 133
Education, Engineering, Council Report on 23
Election to the Society 35
Election, Tellers of 72
Report of Tellers of 93
ELLIS, FRANK I., Obituary 251
ELY, HAROLD F., Obituary 251
Emblems of the Society 36
Employment Bulletin 60
Employment Service 60
Council Report on 27
Offices of 61
Engineering Education 61
Engineering Education and Training, Council Report on 23
Engineering Education Survey, Council Report on 23, 26
Engineering Foundation, Council Report on 26
Engineering Foundation Board 62
A.S.M.E. Representative on 79
Engineering Index 40
Engineering Societies Employment Service 60
Council Report on 27
Offices of 61
Engineering Societies Library 64
Council Report on 26
Engineering Societies, Local, Relation of Local Sections to 44
ERICSON, JOHN E., Obituary 251
Ethics, Code of 65

FALLON, JOHN B., Obituary 252
FARRAND, DUDLEY, Obituary 252
FARRELL, L. EDWARD, Obituary 252
FERMIER, EMILE J., Obituary 253
Finance Committee 34, 70
Report of 121
Finances, Council Report on 23
FISHER, SYDNEY, Obituary 253
FISKE, WARREN M., Obituary 253
FITZGERALD, THOMAS J., Obituary 254
FORSYTH, ROBERT, Obituary 254
FOTHERINGHAM, ROBERT M., Obituary 255
Fuels Division, National Meeting 111
Funds, Trust, Council Report on 23
FURLOW, JAMES W., Obituary 255

GALBRAITH, GEORGE W., Obituary 256
GARTNER, EDWARD V., Obituary 256
General Information 32
General Meetings, Reports of 84
GERHARD, WILLIAM P., Obituary 256
GLEN, HUGH, Obituary 256
GOODELL, JOHN M., Obituary 257
GOODMAN, WILLIAM, Obituary 257
GOODRICH, ROBERT R., Obituary 257

PAGE
Grand Rapids, Report of Wood Industries Meeting at 114
GRAY, JOHN R., Obituary 258
GUSTAFSON, LEWIS, Obituary 258

HALL, HARRIS F., Obituary 258
HANNIFIN, ARTHUR V., Obituary 259
HARRIS, ELMER H., Obituary 259
HARROLD, FREDERICK F., Obituary 259
HASKELL, WILLIAM E., Obituary 260
HEDGES, GEORGE L., Obituary 260
HELLER, H. HOWARD, Obituary 260
Henry Robinson Towne Lecture 95
HERRICK, ERITY F., Obituary 260
History of the Society 33
HOMANS, THOMAS S., Obituary 261
Honorary Members 153
"Human Engineering," Charles M. Schwab 6
HUMPHREYS, ALEXANDER C., Obituary 261
HUNTINGTON, CLARENCE W., Obituary 262

IDELL, FRANK E., Obituary 263
Index to Constitution, By-Laws, and Rules 232
Index to Papers and Reports 160
Industry, Education and Training for. *See* Education and Training for the Industries
Insignia of the Society 36
Institution of Mechanical Engineers, Greetings from 86
International Electrotechnical Commission, Power Test Codes and ... 56
International Electrotechnical Congress, 1927 24
1929, Announcement of 94
Intersociety Relations, Council Report on 25
Iron and Steel Division, Approved by Council 85
National Meeting of 117
JAEGER, MAX, Obituary 263
JAMIESON, FLEMING E., JR., Obituary 264
JEALOUS, ARTHUR R., Obituary 264
John Fritz Medal Board of Award 62
A.S.M.E. Representatives on 80
Council Report on 26
John Fritz Medal, Recipients of 62
JOHNSON, CHARLES L., Obituary 264
Joint Activities 60
Representatives on 79
Joint Conference Committee 63
Purpose of 25
Joseph A. Holmes Memorial Board, A.S.M.E. Representative 80
JUNEAU, CHARLES G., Obituary 264
Junior Awards, Recipients of 46

KAISER, J. O., Obituary 265
Kansas City Regional Meeting, Report of 103
KINYON, ALONZO G., Obituary 265

LACY, RICHARD W., Obituary 266
LAWRENCE, NORMAN SPEAR, Obituary 266
LEVITCH, MOSES D., Obituary 266

PAGE
Library ... 64
Council Report on ... 26
Library Committee ... 71
Report of ... 134
LIMBRUNNER, JOSEF, Obituary ... 266
LISCOM, ARTHUR C., Obituary ... 267
LLOYD, ROBERT McA., Obituary ... 267
Local Sections ... 42
Council Report on ... 24
Local Sections Committee ... 70
Report of ... 130
Local Sections Conference, Annual Meeting ... 97
Local Sections, Grouping of, for Nominating Committee ... 73
LUNDELL, GEORGE ALBEN E., Obituary ... 267

Machine-Shop Practice Division, National Meeting ... 109
MACKIE, EDWIN M., Obituary ... 268
MADISON, HARRY A., Obituary ... 268
Management Division, National Meeting ... 116
Managers, Past ... 156
MANLY, CHARLES M., Obituary ... 268
MAZZUR, FRANK A., Obituary ... 269
McEWEN, JAMES H., Obituary ... 269
Mechanical Engineering ... 38
Meeting, Annual. *See* Annual Meeting
Semi-Annual. *See* Spring Meeting
Spring. *See* Spring Meeting
Meetings, Business. *See* Business Meetings
Council. *See* Council Meetings
Council Report on ... 24
General, Reports of ... 84
Papers for ... 37
National. *See* National Meetings
Regional. *See* Regional Meetings
Reports of ... 82
Scope of ... 36
Meetings and Program Committee ... 36, 70
Report of ... 125
MEISTERKNECHT, HERBERT, Obituary ... 270
Melville Medal, Presentation of ... 93
Membership ... 34, 158
Council Report on ... 25
Privileges of ... 35
Membership Committee ... 70
Report of ... 127
Membership List ... 39
Memorial Notices ... 241
MICHAL, JAROSLAV A., Obituary ... 270
MITCHELL, JOHN R., Obituary ... 270
MOODY, WILLIAM F., Obituary ... 271
MOSSMAN, JOSEPH BENNETT, Obituary ... 271

NAILLER, RAYMOND F., Obituary ... 271
National Defense Division, National Meeting ... 107

PAGE
National Meetings 37
Papers Presented at. *See* National Meetings, Technical Sessions at
Relation of Professional Divisions to 41
Reports of 106
Technical Sessions at
Aeronautic 106
Fuels 111
Iron and Steel 117
Machine-Shop Practice 109
Management 116
National Defense 107
Printing Industries 110
Wood Industries 114
National Research Council, Division of Engineering, A.S.M.E. Representatives 80
Necrology 241
NEELAND, MARVIN A., Obituary 271
New England Council, Manufacturing Equipment Survey 93
New Haven Meeting 109
New Haven, Report of Machine-Shop Practice Meeting at 109
New York, Report of Annual Meeting at 103
Report of Printing Industries Meeting at 110
Nominating Committee 33, 72
1928, Announcement of 84

Obituaries 241
Objects of the Society 33
Officers 33
1927 69
1928 93
Past 154
OSBORNE, L. EDWARD, Obituary 272

PALMGREN, GEORGE A., Obituary 272
Papers, Discussion of 38
For Meetings 37
Index to 160
Past Officers 154
PEARSON, MARK, Obituary 273
PERRY, ERNEST B., Obituary 273
PHILBRICK, FRANK B., Obituary 273
PHILLIPS, CHARLES HILL, Obituary 273
Pittsburgh, Selection for 1928 Spring Meeting 83, 85
PLUNKETT, CHARLES T., Obituary 274
POPP, JONAS L. T., Obituary 274
Power Test Codes, General Information on 52
International 55
Power Test Codes Committee 71
Reports of 147
Committee Meetings, Annual Meeting 96
Committees, List of 77
POWERS, JAMES, Obituary 275
Presidential Address 6
Presentation of 93
Presidential Appointments 29

PAGE
Presidents, Past 154
PRESTON, GEORGE B., Obituary 275
Printing Machinery Division, National Meeting 110
Prizes. *See* Awards
Professional Conduct Committee 66, 72
Professional Divisions 40
Conference on Work of, Annual Meeting 96
Council Report on 24
Four Point Program 129
National Meetings 106
Professional Divisions Committee 70
Report of 128
Publications 38
Council Report on 24
Publications Committee 70
Report of 126
Publications Policy, New, Approved by Council 85
Presented at Business Meeting 83

QUINCY, CHARLES F., Obituary 275
QUIGG, EDWARD A., Obituary 275

Record and Index 39
Regional Meetings 37
Papers Presented at 103, 105
Relation of Local Sections to 43
Reports of 103
Technical Sessions at 103, 105
Relations with Colleges Committee 71
Report of 132
Reports, Committees 120
Council 22
Index to 160
Meetings 82
Research, Industrial, Status of 24
Surveying for 42
Research Activities, General Information 47
Research Committee 71
Research Committee Meetings, Annual Meeting 95
Spring Meeting 87
Research Committees, List of 73
Reports 134
Rochester, Report of Management Meeting at 116
ROGERS, CHARLES EDWARD, Obituary 276
ROLLMAN, BRUCE B., Obituary 276
Rules of the Society 215
RUMSEY, SPENCER S., Obituary 276

Safety Codes Committees, List of 78
Safety Committee 72
Report of 148
Safety Work, General Information on 56
St. Louis, Report of Fuels Meetings at 111
SANDERS, SHERMAN, Obituary 277
SARGENT, HENRY B., Obituary 277

PAGE
SCHAUFUS, HUGH A., Obituary 278
SCHWAB, CHARLES M., Biographical Sketch 21
Presidential Address 6
Seattle Regional Meeting, Report of 104
Secretaries, Past 158
Semi-Annual (Spring) Meeting, Report of 84
Semi-Centennial Celebration, 1930 24
SHADALL, CHARLES E., Obituary 278
SMITH, GERSHOM, Obituary 278
SMITH, JESSE M., Obituary 279
SMITH, MERRILL VAN G., Obituary 279
SOBECK, HERMAN F., Obituary 280
Society for the Promotion of Engineering Education, Board of Investigation and Coordination, A.S.M.E. Representatives 80
SPACKMAN, HENRY SPENCER, Obituary 280
Special Committees 72
Spring Meeting, Papers Presented at 90
Report of 84
Technical Sessions at 89
Spring Meetings 37
Standardization, Financial Support of 52
Standardization Activities, General Information on 50
Standardization Committee 71
Standardization Committee Meetings, Annual Meeting 96
Spring Meeting 88
Standardization Committees, List of 75
Reports of 143
Standards, Presentation by Title at Business Meetings 83, 84
Standing Committees, Chairman of 69
STEEN, ARTHUR B., Obituary 281
STIRLING, ALLAN, Obituary 281
Student Branch Awards, Recipients of 47
Student Branch Conference, Annual Meeting 98
Student Branches 44
STUTZ, CHARLES C., Obituary 282

Technical Committees, Council Report on 24
List of 73
Technical Sessions, Annual Meeting 98
National Meetings. *See* National Meetings, Technical Sessions at
Regional Meetings 103, 105
Spring Meeting 89
Tellers of Election 72
Report of 93
Test Codes. *See* Power Test Codes
THOMAS, GEORGE B., Obituary 282
THORPE, ALBERT E., Obituary 282
THURSTON, GEORGE H., Obituary 283
TILDEN, JAMES ADDISON, Obituary 283
TODD, JAMES, Obituary 283
Towne Lecture 95
Transactions 38
Treasurers, Past 158
Trust Funds, Council Report on 23
TUPPER, CARLETON W., Obituary 284

PAGE
United Engineering Society 64
A.S.M.E. Representatives on 80
Council Report on 26

Vice-Presidents, Past 155

WALKER, PERLEY F., Obituary 284
WARREN, WALTER BURGESS, Obituary 284
Washington Award 65
WESTEN, CHRISTIAN H., Obituary 285
West Point, Report of National Defense Meeting at 107
Western Society of Engineers, Washington Award of 65
Washington Award, A.S.M.E. Representatives on 80
White Sulphur Springs, Report of Spring Meeting at 84
WILLE, HENRY V., Obituary 285
WILLIAMS, IRVING, Obituary 286
WILSON, JAMES E., Obituary 286
Woman's Auxiliary 67
Report of at Council Meeting 85
WOOD, CHARLES R., Obituary 286
Wood Industries Division, National Meeting 114
WOODS, GEORGE E., Obituary 287
WOOLSON, IRA H., Obituary 287

Youngstown, Report of Iron and Steel Meeting at 117

ZEHNDER, CHARLES HENRY, Obituary 287

621 06 A51R V01 1927
AMERICAN SOCIETY OF MECHANICAL ENGINE

INSERT BOOK
MASTER CARD
FACE UP IN
FRONT SLOT
OF S.R. PUNCH

UNIVERSITY OF ARIZO
LIBRARY

MASTER CARD

GLOBE 901144-0

621.06 A51R V01 1927
a39001 00731838 2b